FLIGHT

MAGAZINE

AUGUST 1957

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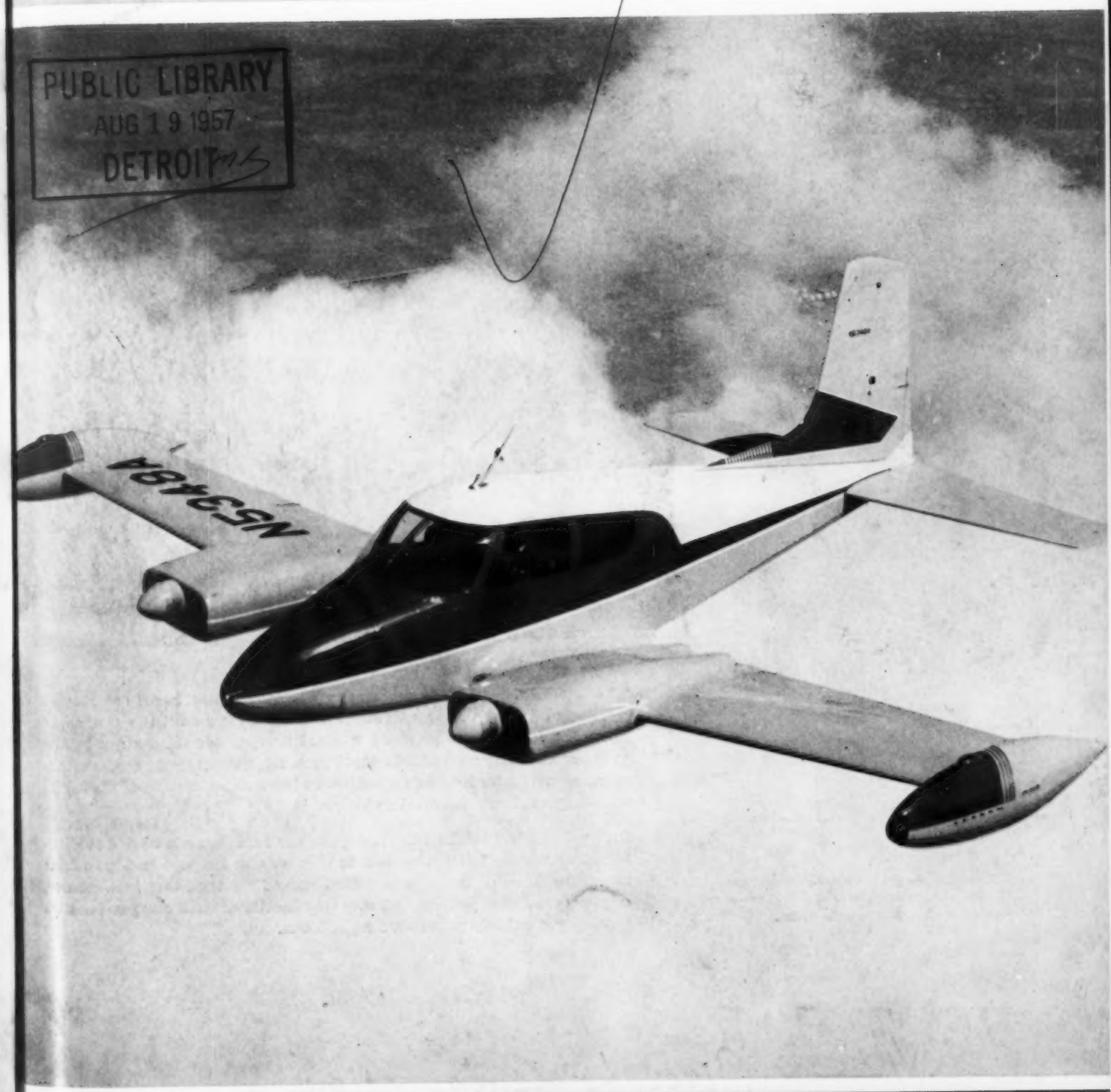

NEW CESSNA MODEL 310B

Vertol tests world's first Tilt-Wing VTOL Research Aircraft

The new Vertol 76 is a true Vertical Take-Off and Landing (VTOL) aircraft, an experimental vehicle that casts a large shadow into the future.

With its ability to take off, hover and land like a helicopter it is independent of all but the most rudimentary landing area. Yet it flies from point to point with the dispatch of a turbo-prop passenger plane.

In this pioneer air vehicle the wing and rotor-propellers tilt as a unit through a 90° arc at the will of the pilot. For vertical flight he rotates the wing upward. To fly level he tilts the wing forward. Given a small runway, he can set the wing at the most effective angle to operate Model 76 as a Short Take-Off and Landing (STOL) aircraft and thus increase payload potential.

The Model 76, soon to undergo flight tests, has been developed by Vertol for the Army Transportation Corps and the Office of Naval Research as part of the military's ceaseless quest for greater mobility and efficiency. From flight tests will come experience and knowledge applicable to the bright future of VTOL in military and commercial aviation.

Since 1943 Vertol has been a pioneer in research and development of vertical lift aircraft. It is now the largest independent manufacturer of helicopters. You may find that our know-how, our experienced personnel, our test facilities and our productive capacity can help you solve a problem.

Engineers, if you are not already working for the government or defense industry, investigate job opportunities with Vertol.

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Flying Fair Lady

—Harriet Quimby, America's First Licensed Woman Pilot

(Photos courtesy Institute of Aeronautical Sciences)

Pretty Harriet Quimby attained success in two masculine strongholds—journalism and aviation—in a day when women were not even allowed to vote.

While still in her teens, Miss Quimby became a newspaper reporter in San Francisco; and, in a short time, advanced to the position of Drama Editor on Leslie's Weekly in New York. There she learned to fly under the guidance of John Moissant, famous early-day aviator. It was on August 1, 1911, that Miss Quimby became America's first licensed woman pilot. Then, following months of preparation, Miss Quimby flew the English Channel on April 16, 1912—the first woman to do so.

Miss Quimby returned to America and made exhibition appearances in this country and Mexico. Noted for her beauty as well as her daring, Miss Quimby was a symbol of increasing feminine equality for American women.

● A pioneer in research and development of aviation fuels, Phillips Petroleum Company is, today, a foremost supplier of high octane gasoline for commercial, private and military aircraft. In step with the future, Phillips is a leading producer of *super-performance* jet fuels for the latest designs in turbo-props and jets. And Phillips research continues to lead the way for development of fuels for the aircraft of tomorrow.

AVIATION DIVISION • PHILLIPS PETROLEUM COMPANY • BARTLESVILLE, OKLAHOMA

AIR Report
Significant Trends and News

BELL X-14 TEST-BED FOR VERTICAL TAKE-OFF AND LANDING, powered by two 1,750-lb. Armstrong-Siddeley ASV.8 Viper jets with directional thrust controls for vertical and forward propulsion and wingtip and tail air jets for control at low speeds, is shown at Bell Aircraft Corp. Bell used Beech components for it, such as Bonanza wings, ailerons and landing gear and tail parts from the Beech Mentor, buying them from Beech for much less than development costs.

—(Bell Aircraft Photos.)

NONSTOP 5,500-MILE HOUSTON-TO-ROME HOP in a 4-place, 150-hp. Mooney Mark 20 is planned for late August by Tom McMurry, 32, of Houston. Mooney factory at Kerrville, Texas, is equipping his "Spirit of Texas" plane with extra tanks for minimum of 250-gal. fuel supply and 40-hour endurance. McMurry would continue from Rome for a solo round-the-world trip. He will use a Tactair autopilot and fly from the right seat.

PIPER APACHE WITH AUTOMOTIVE SUPERCHARGER is being flown in an experiment by Leo Yoder, Long Beach operator, to perfect the installation for CAA licensing. No performance or details are available but Yoder is said to be getting "plenty" of power as high as 14,000 ft. This might indicate 190-mph. or faster speeds for the Apache at that altitude and single-engine performance well above 8,000 ft.

SIX MORRISEY NIFTY TANDEM TRAINERS are being built in the first production order by Morrisey Aviation, Inc., at Orange County Airport, Santa Ana, California. Bill Morrisey, who licensed the low-wing, tricycle-gear trainer before taking it on a national tour, said it will feature a 115-hp. Lycoming engine and will cruise at 120-125 mph. Gross weight is 1,450 lbs., empty 875 lbs., fuel 30 gals, in two 15-gal. wing tanks. Morrisey has 10 persons on the project and they have already finished all the parts and pieces to complete the first six airplanes, with the first flight due in August. He has not yet priced the all-metal Nifty but hopes to hold it to the $6,000-$7,000 bracket.

MODIFIED SUPER T-6 TRAINER in initial flight tests has cruised 216 mph. at 10,000 ft. using 64% horsepower as compared to 170 mph. for the standard North American T-6, according to Erle L. Bacon Corp.,

FLIGHT MAGAZINE

AUGUST, 1957 VOL. 46, No. 8

THIS MONTH'S COVER shows the new and improved 5-place Cessna 310B, which features more cabin seating flexibility for comfort, better soundproofing with thicker windshield and dual windows, new instrument panel design and other refinements. The 310B cruises 213 mph. at 8,000 ft. using 70% of horsepower. —(Cessna Photo.)

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New Business in the Hangar—NATIONWIDE ROUNDUP OF INTERESTING DEVELOPMENTS AT MODIFICATION CENTERS . . 46

GEORGE E. HADDAWAY, Editor-Publisher; TOM ASHLEY, Managing Editor; FRED N. STONES, JR., Business Manager; LOUISE ROBERTSON, Circulation; E. H. PICKERING, *Consultant*; P. O. BOX 750 (2700 N. Haskell Ave.), Dallas, Texas—Telephone TAylor 3-6191.

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Santa Monica. Conversion includes Gordon Israel-designed pressure cowl, jet stacks and augmentor cooling; four-foot wing clipping, with tip tanks, and tricycle gear.

EIGHT PERSONAL AIRCRAFT MANUFACTURERS DELIVERED 3,295 AIRPLANES IN FIRST HALF OF 1957, according to the Utility Aircraft Council, Aircraft Industries Association. Figures for January-June deliveries are as follows: TWINS: Aero Commander 680, 70; Aero Commander 560A-E, 11; Beech E18S, 64; Beech D18S, 3; Beech Twin-Bonanza, 56; Cessna 310, 70; Piper Apache, 237. SINGLE-ENGINE: Beech Bonanza, 281; B-45, 25; Call-Air A4, 15; Cessna 170B, 36; Cessna 172, 413; Cessna 180, 255; Cessna 182, 483; Champion 7EC, 69; Champion 7FC, 39; Mooney Mark 20, 41; Piper Super Cub, 484; Piper Tri-Pacer, 637, and Taylorcraft Model 20, 6.

NEW TRANSCONTINENTAL SPEED RECORD of 3 hrs. and 23 mins. was set last month by a Chance Vought F8U-1P Crusader flown by Marine Major John Glenn, who averaged 725.55 mph. or Mach 1.1 for the 2,456-mile course from Los Alamitos, Calif., to Floyd Bennett Field, N. Y. His ship was a photo-reconnaissance version of the Navy shipboard fighter and was refueled in the air three times on the supersonic crossing.

PIPER AIRCRAFT'S 45,000TH AIRPLANE will be produced in August with an open house celebration at the Lock Haven (Pa.) factory on August 17 marking the achievement. No other manufacturer in the world has produced as many commercial airplanes as Piper. Visiting pilots and their guests will be served free lunch for the open house and will see the new 4-place Comanche in its first public showing.

FEDERAL COMMUNICATIONS COMMISSION HAS APPROVED 123.0 MC for unicom purposes at airports having control towers and fixed-base operators are beginning to guard the frequency as a service to flying customers. Some airports will use a single statior for the service, operators on the field being connected by land lines. This system is going in at Love Field in Dallas, for example, where Associated Radio will operate the station. All subscribing operators will guard it so that a flying customer calling in for ground transportation, telephone messages, car rental or special services will be heard by all. By agreement, only the operator identified by the caller will respond. If this operator is closed or does not respond, the caller will be advised and can then request another operator's service. The 123.0-mc. frequency shall not be used for air traffic control purposes. Use of the frequency for special services will expedite ground handling and trans-

4 Reasons Why - -

●Photo, courtesy of National Aircraft Corp., Burbank, California, shows their Model NA75 powered by Pratt and Whitney R985 engine.

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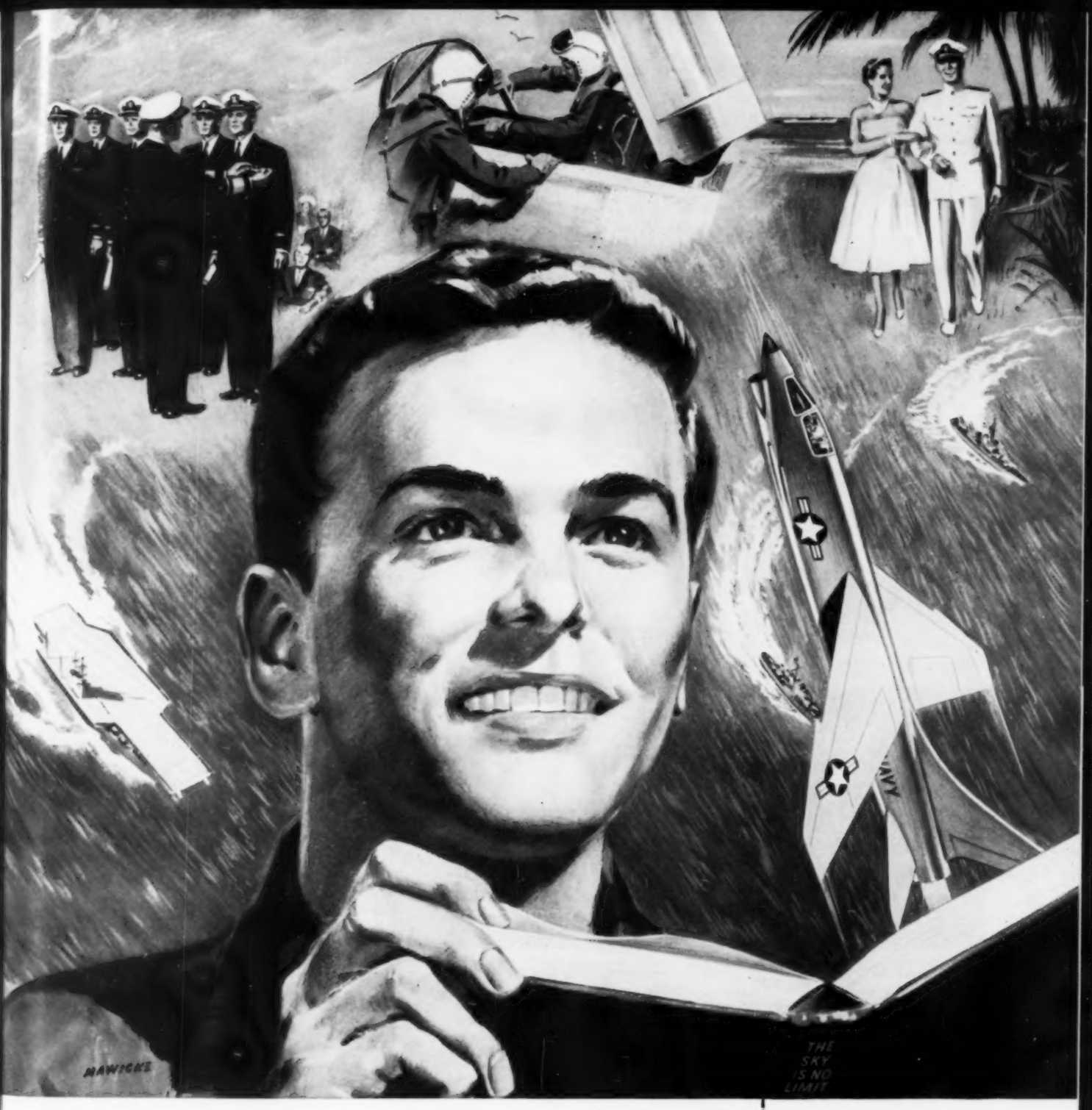
NEW AERO COMMANDER FACTORY EXECUTIVES are Tom Harris (left), director of marketing, and John W. Laister, vice president of operations. Harris was for years with American Airlines, being director of freight sales when he joined Aero Design at Oklahoma City recently. Laister was president of Laister-Kaufmann Aircraft, St. Louis, in producing gliders during the war and recently resigned as vice president of manufacturing of Pacific Airmotive at Burbank to join Aero Design.



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Here is the stuff that makes dreams come to life. There's a dash of science fiction...a bit of practical engineering...the clasp of a friendly hand...and a touch of faraway romance. There's adventure. And action. But above all, there is flight as the world below never knows it. Navy pilots are *given* nearly $100,000 worth of the world's finest executive training before they take command of the controls in high-performance jets like the Chance Vought F8U-1 *Crusader*, record-breaking Navy fighter. And when they make that final grade...the sky's no limit on any future they may choose.

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GLOBE AUTOPILOT HOLDS YOUR MAGNETIC HEADING

Cessna and Tri-Pacer owners . . . if you fly for business, here's news about an autopilot designed to make your plane more useful while you **relax.** The Globe Mark II Autopilot holds your magnetic heading automatically on cross-country flights, with a heading repeatability of 2° or less! Heading control is from an especially stable magnetic compass engineered by Globe.

Since the Mark II does not depend on a directional gyro or vacuum system, it provides two important advantages: You don't need to constantly correct for gyro drift, and you have the safety feature of **two** sets of instruments.

Moreover, a Globe flight control system gives you maximum flying value at minimum cost because you are guarded against obsolescence . . . you can get a basic Gyro/Stabilizer now ($675), and add a Heading/Lock conversion kit later ($725), or you can get a complete Mark II Autopilot complete for $1350. New developments (already in the works) will add to the Globe you already have.

Globe Gyro/Stabilizer at $675 gives you the convenience of short-term heading control, stable controlled turns up to a rate of 3° per second, and positive spiral stability. It's a "third hand" when you need time to navigate, communicate, or cogitate. Hundreds are already in use.

Mark II Autopilot at $1350 holds your magnetic heading automatically hour after hour in addition to the benefits you get in a Gyro/Stabilizer. At your option the Mark II can include a remote compass indicator for panel mounting . . . it becomes your most useful navigation instrument.

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and information on how to arrange a free demonstration flight.

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portation and thereby improve business aircraft usefulness.

NEW COMMERCIAL SALES MANAGER, domestic market, of Bell Helicopter Corp. at Ft. Worth is Fred L. Roscoe, formerly domestic sales manager of Cessna Aircraft Co. Harvey Gaylord, Bell president, said his appointment reflects the firm's emphasis on commercial helicopter sales. Roscoe joined Cessna in 1953 as regional sales manager and became domestic sales manager in 1956. Cessna's domestic business quadrupled while he was with the firm.

Roscoe

FOUR CONVAIR 880 JET AIRLINERS have been ordered by the Brazilian airline, Real-Aerovias, for more than $17,000,000. . . . **SLICK AIRWAYS** has sold a DC-6A to Alaska Airlines.

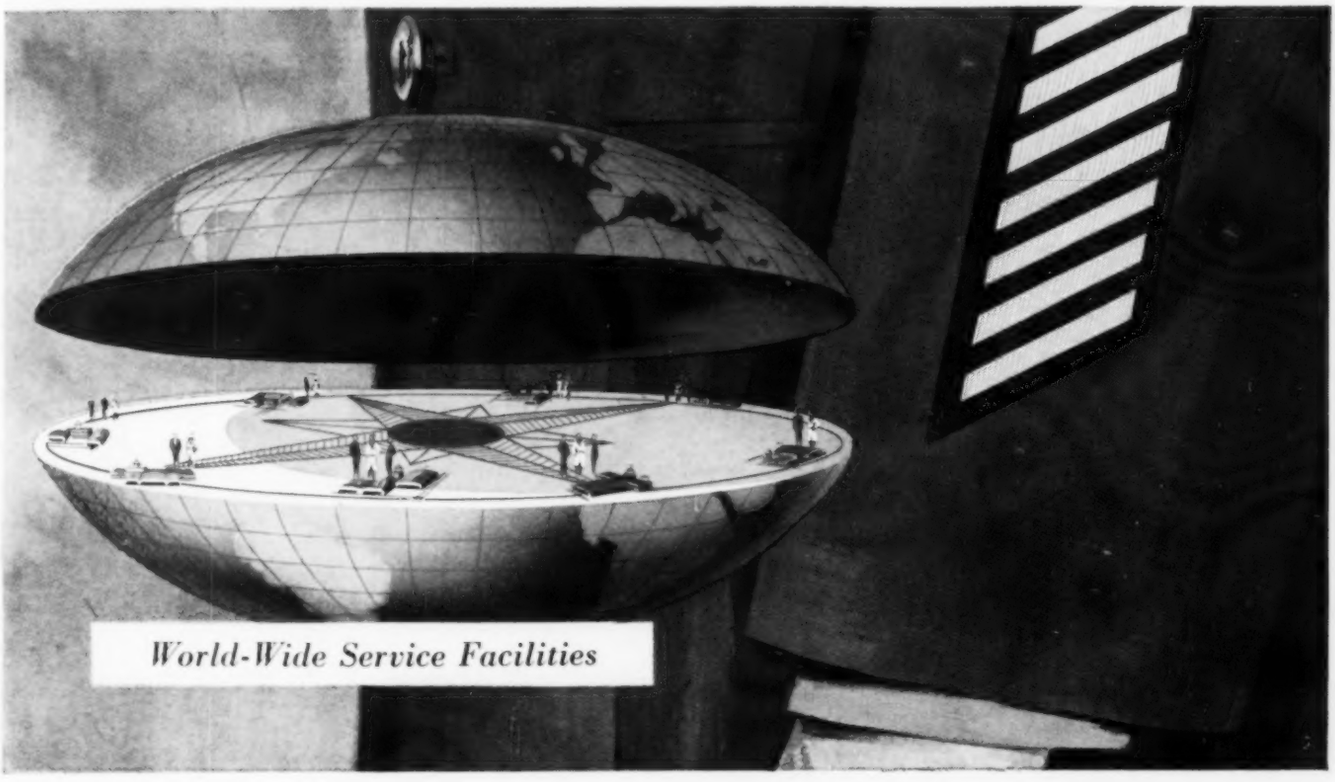
LEAR'S NEW LGSR-1 GLIDE SLOPE RECEIVER, with transistorized power supply, weighs only 5 lbs. and is said to be the lightest glide slope receiver yet marketed. It is contained in a one-quarter ATR short-length case and meets CAA, military and ARINC requirements.

CIVIL AIRCRAFT REGISTERED WITH CAA NUMBERED 87,531 as of Jan. 1, 1957, up 2,211 over the previous year's registration, according to "Statistical Study of U. S.

(Continued on page 17)

NEW BEECH DISTRIBUTOR AT ST. LOUIS is Dewey B. Young of Young Aviation Corp., shown at right above with Leddy Greever (left), Beech vice president-commercial sales, and William F. Quinby, center, Beech regional sales manager. Located on Lambert Field, Young's distributorship includes parts of Missouri, Illinois and Kentucky.

A VETERAN SERVICE ORGANIZATION



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It is important to remember that when you specify Bendix Jet Ignition you get not only the best in design and performance, but you are assured that wherever you fly, the finest service organization in the industry is readily available to maintain the quality that has made Bendix—The Most Trusted Name in Ignition.

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Add to the PLUS PERFORMANCE the many other fine features of the Tri-Pacer and you'll see why this airplane far outsells other aircraft in its class.

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Cruising Speed, 70%—10,000 ft.	210 mph	230 mph
Stall Speed, gear and flaps down, power off	66 mph	71 mph
Take-off Distance to clear 50-ft. obstacle at S/L	1,452 ft.	1,540 ft.
Landing Distance to clear 50-ft. obstacle at S/L	1,500 ft.	1,625 ft.
Gross Weight	6,500 lbs.	7,000 lbs.
Useful Load	2,200 lbs.	2,670 lbs.
Range, with 30-minute reserve	1,625 mi.	1,480 mi.
Service Ceiling, 2 engines	22,500 ft.	24,200 ft.
Ceiling, one engine	8,000 ft.	15,000 ft.
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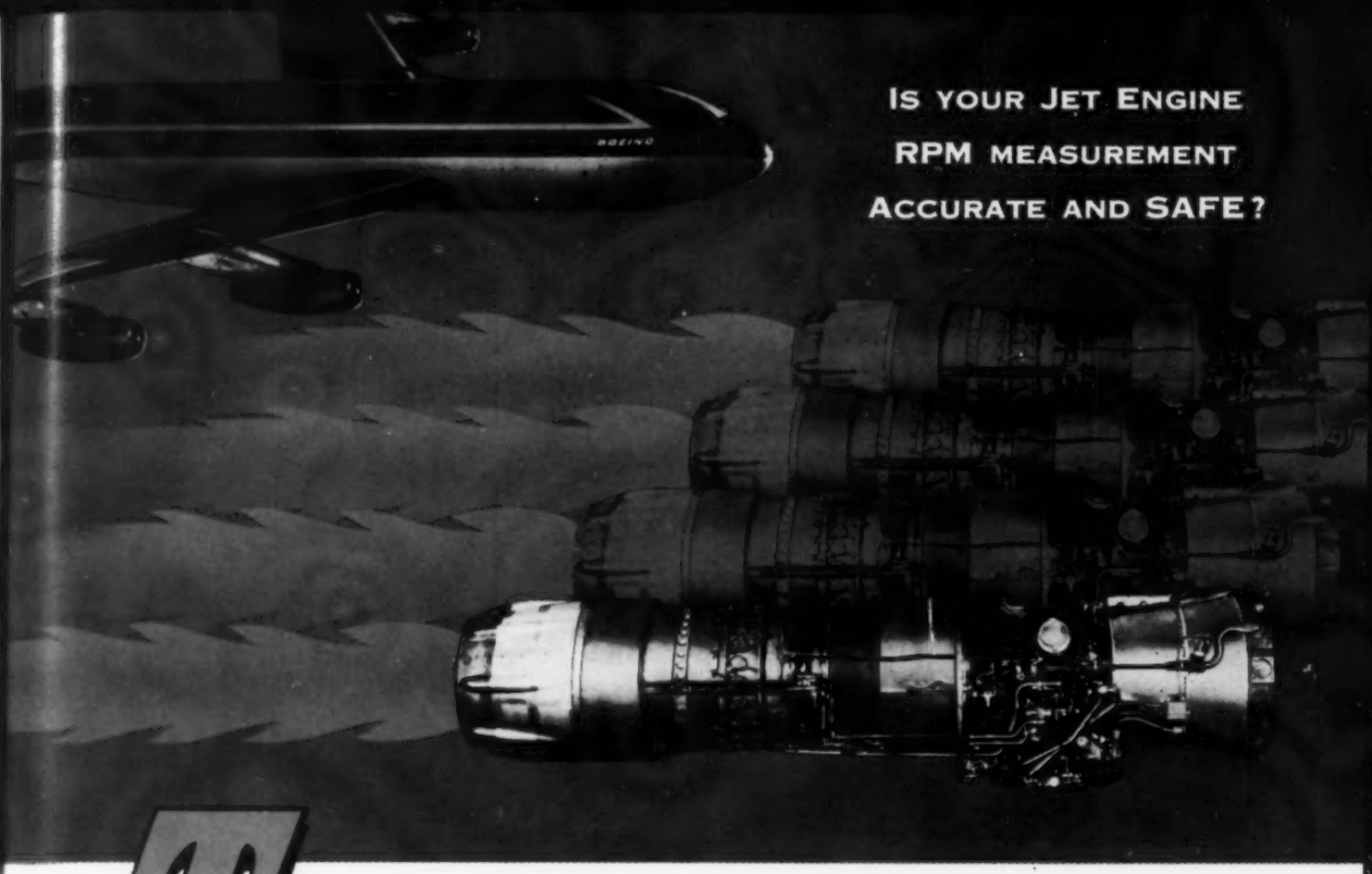

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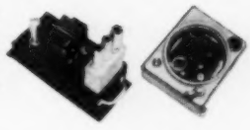

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*Floyd Childs, Abilene, Texas . . . another Mark 20 owner.

COMPARE the Mark 20 with other four-place executive airplanes.

& DISCOVER why the Mark 20 is years ahead in styling and performance.

	Mark 20	Plane Type 82	Plane Type 72	Plane Type TP
PERFORMANCE				
Cruising Speeds (70% h.p.)	165 mph	155 mph	124 mph	128 mph
Engine h.p.	150 hp	230 hp	145 hp	150 hp
Range	900 miles	655 miles	620 miles	525 miles
Pay Load	720 lbs.	679 lbs.	673 lbs.	669 lbs.
Rate of Climb	900 ft./m	1030 ft./m	660 ft./m	725 ft./m
Service Ceiling	17,200 ft.	19,800 ft.	13,330 ft.	15,000 ft.
SAFETY				
Military proven low-wing visibility	Yes	No	No	No
Tubular steel safety cabin	Yes	No	No	Yes
All-weather adjustable engine cooling system.	Yes	No	No	No
Non-fatigue spruce wing	Yes	No	No	No
ECONOMY				
Miles per gallon	20	12.7	15	14.7
Cost per engine hour of operation (Based on engine exchange prices)	$1.00	$3.45	$1.50	$ .93
Fuel cost per mile	2c	2.8c	2.4c	2.6c
Total cost per mile (Based on 600 hours operation per year)	6.6c	9.8c	8.2c	8.3c

The Mark 20 is the first "really new" executive plane in years. Its new aerodynamic design features of the jet age produce greater performance with less horsepower. Mooney wants comparisons. Mooney wants you to be the judge.

The years-ahead Skystreak Styling of the Mark 20 brings to you a combination of economy, safety, and high performance. Features include laminar flow wing — the only flexible wing on an executive airplane — no-drag trim, full sky visibility, retractable tri-cycle landing gear, and low center of gravity for ease of handling on the ground and in strong cross winds.

You're years and money ahead when you own a Mark 20. Make comparisons, get the facts. See your Mooney distributor.

*Owner and operator of Childs Ready-Mix Concrete Co. in Abilene, Texas, Mr. Childs has 300 hours of flying time with 260 hours in a Mark 20. Also, Mrs. Childs has a private license and 85 hours of flying time—all in a Mark 20.

MOONEY AIRCRAFT INC., KERRVILLE, TEXAS

MOONEY AIRCRAFT, INC., Kerrville, Texas

I am interested in ☐ purchasing a Mark 20
☐ Mark 20 sales franchise.
☐ Information on the Mark 20.

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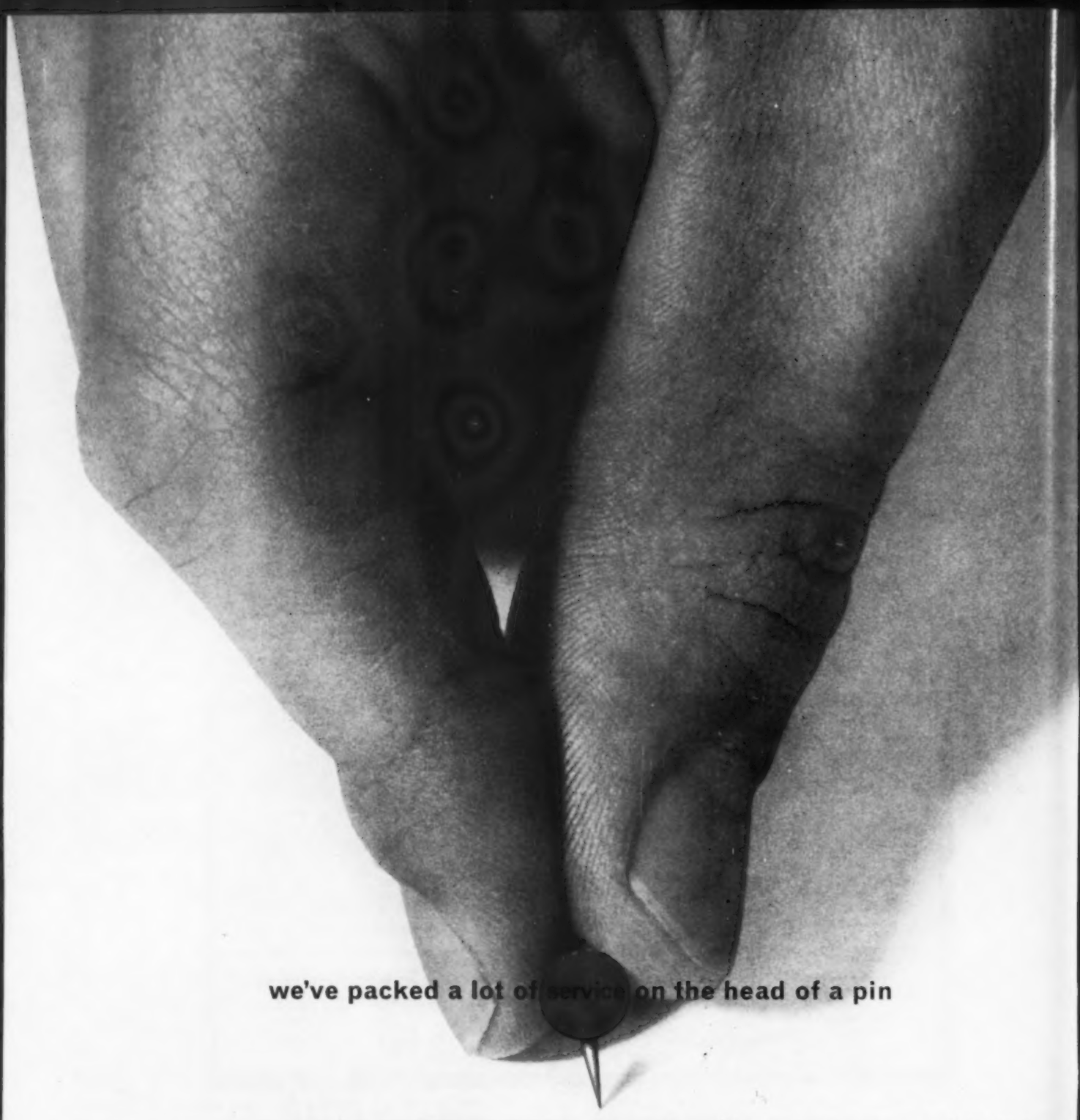

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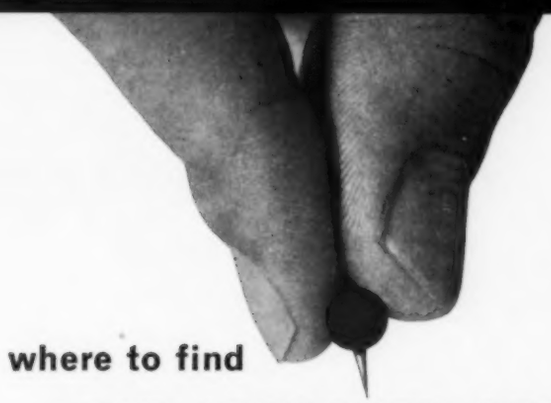


where to find

LEAR APPROVED SERVICE

Type of Service:

(C) Communications Radio • (N) Navigational Equipment • (F) Flight-Control Systems • (G) Gyro Overhaul

ARIZONA, Phoenix
Aero Electronics, Inc. CN
Sky Harbor Airport
Sun Valley Air Service CN
Sky Harbor Airport

CALIFORNIA
Hawthorne Bates Aviation CNF
Hawthorne Airport
Long Beach Air Oasis Company CNF
Long Beach Municipal Airport
Oakland Bayaire Avionics CNF
Oakland Municipal Airport
Palo Alto Fred A. Becker Aviation Radio C
Palo Alto Municipal Airport
San Jose Wright Brothers Aviation CNF
San Jose Municipal Airport
Santa Ana Martin School of Aviation CN
Orange County Airport
Santa Monica
Executive Radio & Aircraft Service Inc. CNF
Santa Monica Airport
Van Nuys Plane Service, Inc. CN
Van Nuys Airport

COLORADO, Denver
Clinton Aviation CNF
Stapleton Airport

CONNECTICUT, New Haven
Usher Aviation CNF
Municipal Airport

DELAWARE, Wilmington
Atlantic Aviation Corp. CNF
New Castle County Airport

DISTRICT OF COLUMBIA, Washington
Butler Aviation CNF
Washington International Airport

FLORIDA, Lantana
E. Farnell & Company, Inc. CNF
Palm Beach County Airport

GEORGIA, Atlanta
Southern Aero, Inc. F
Municipal Airport

ILLINOIS
East Alton Walston Aviation CNF
Civic Memorial Airport
Springfield Capitol Aviation CN
Municipal Airport

KANSAS, Wichita
Lear, Inc. CNF
Wichita Municipal Airport

KENTUCKY, Louisville
Aircraft Radio Laboratory CN
Bowman Field

MICHIGAN
Detroit Servair, Incorporated G
Detroit City Airport
Grand Rapids Lear, Inc. CNF
Grand Rapids Airport

MINNESOTA
Minneapolis Minnesota Airmotive, Inc. CN
Wold-Chamberlain Field
Rochester Gopher Aviation, Inc. CNFG
Lobb Field

NEW JERSEY, Teterboro
Atlantic Aviation Corp. CNF
Teterboro Airport
Consolidated Instrument Co., Inc. G
Teterboro Airport

NEW MEXICO, Santa Fe
Southwestern Skyways, Inc. CNF
New Municipal Airport

NEW YORK
Buffalo Buffalo Aeronautical Corp. F
Buffalo Airport
Flushing, Long Island Butler Aviation Service, Inc. CN
La Guardia Airport
Lindenhurst, Long Island Dot Airtronics, Inc. CNF
Zahns Airport
Rochester Page Airways, Inc. F
Municipal Airport
Ronkonkoma, Long Island
Air Mar Radio Service, Inc. CNF
MacArthur Airport

NORTH CAROLINA, Charlotte
Southern Flight Service, Inc. F
Municipal Airport

OHIO
Cincinnati Airborne Communications, Inc. CNF
Lunken Airport
Cincinnati Aircraft, Inc. CN
Lunken Airport
Youngstown Youngstown Airways, Inc. CN
Municipal Airport

OKLAHOMA, Tulsa
Tulsair Distributors, Inc. CNF
Municipal Airport

OREGON
Portland Flightcraft, Incorporated CNF
Portland International Airport
Oregon Air-Motive G
Portland International Airport
Troutdale Skyways, Incorporated CNF
Portland-Troutdale Airport

PENNSYLVANIA, Reading
Reading Aviation Service CNF
Municipal Airport

SOUTH CAROLINA, Charleston
Hawthorne Flying Service F
Municipal Airport

TEXAS
Dallas Dallas Aero Service CN
Love Field
Houston Aviation Instrument Manufacturing Corp. G
International Airport
Allied Instrument Laboratories F
Municipal Airport
San Antonio Airnews, Inc. CN
International Airport
Howard Aero Service CF
International Airport

UTAH, Ogden
Southwestern Skyways, Inc. CNF
Ogden Municipal Airport

VIRGINIA, Sandston
Aircraft Radio Service CNF
Byrd Airport

WASHINGTON, Seattle
Airline Services, Inc. C
Boeing Field

WISCONSIN, Milwaukee
Anderson Air Activities CN
General Mitchell Field

CANADA, ALBERTA — Calgary
Foothills Aviation, Limited CNF
Municipal Airport

CANADA, QUEBEC — Montreal
Laurentide Aviation, Limited C
Cartierville Airport

AIR REPORT

(Continued from page 8)

Civil Aircraft as of January 1, 1957," now on sale at the U. S. Department of Commerce for 50 cents per copy. Of the total, 64,688 held current airworthiness certificates and 58% of the active aircraft were manufactured prior to 1948.

TOP WINNERS IN NATIONAL FLYING CLUB ASSOCIATION'S national safety program were announced last month as being (1) the Progressive Flying Club, Inc., Hawthorne, Calif., with 114 certificated members; (2) the Cross Roads Flying Club, Albuquerque, with 6 certificated members logging 1,380 hours during the year, and (3) the Umpqua Flying Club, Roseburg, Oregon, with 47 certificated members.

COLLINS RADIO is building a new $1,700,000 engineering and development center on a 200-acre site in Richardson, a Dallas suburb. . . . **TEMCO AIRCRAFT'S NEW AIR-CONDITIONED ENGINEERING CENTER** at Garland, Dallas suburb, was occupied last month when the first of more than 1,000 Temco engineers moved in.

COLONEL BERNT BALCHEN, pioneer polar airman, has received the first award of the newly-established National Pilots Association award as an outstanding aviator.

FIRST 4-ENGINE DE HAVILLAND HERON in airline service in the U. S. was placed into operation last month by Illini Airlines between Chicago and Rockford, Ill., and De-

(Continued on page 20)

PINTO FOR PRIMARY TRAINER is now the Navy's name for its new Temco TT-1 jet trainer, thanks to last month's christening in Dallas by Actress Jayne Mansfield and her daughter.

—(Temco Photo.)

SAC Silver Jubilee Newsreel

BY JACK PATTON

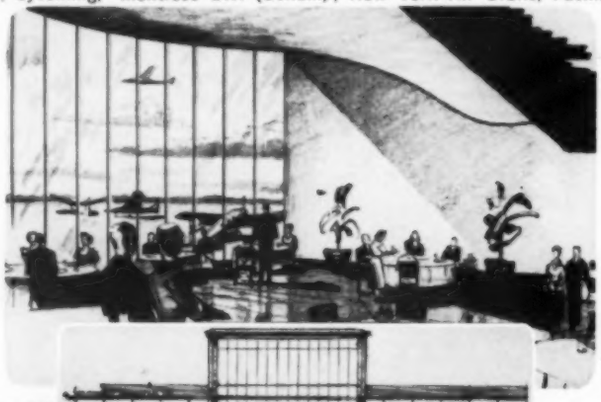
ON THE WAY
WANNA SWAP?
SAC....AFTER WWII..... EVOLVED THE INDUSTRY'S FIRST LARGE-SCALE ENGINE EXCHANGE PROGRAM.
LIKE SEARS & ROEBUCK!
NEXT CAME AN UNPRECEDENTED CATALOG OF FLAT RATE PRICES FOR SERVICE.
ZOUNDS.. MOTHS!
IN '46, RED-HEADED JIM LOCKART WAS HIRED AS TREASURER. HE'S NOW VP-SERVICE.
GEEZ!
WOW!
AND 30 ACRES OF RAMP
SAC's ENDLESS GROWTH ZOOMED IN '46-'47 WITH LEASING OF ATC's EX-BASE AT LOVE FIELD.

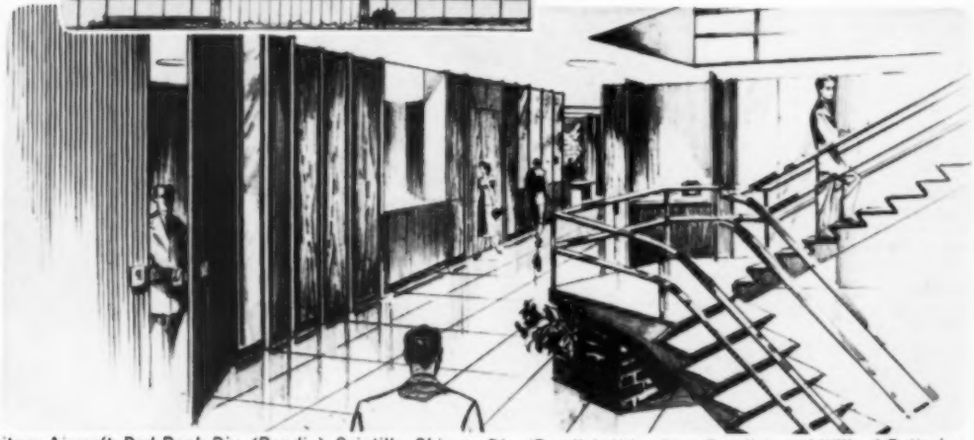
AC, Aeroquip Corp., A. P. Parts Co., Bendix Products Div., B. F. Goodrich, Canadian P & W A, Delco-Remy, Eclipse-Pioneer, Glidden Co., Gould Nat'l Batteries

Here, where SAC gained fame as business flying's "Biggest Service Station", the city of Dallas now has built a great new airline terminal. In a sense, this is "hallowed ground"—we trust the mighty airliners treat it kindly!

Grimes Mfg. Co., Hamilton Standard, Lycoming, Montrose Div. (Bendix), New York Air Brake, Pacific Div. (Bendix), Packard Electric, Pesco

Across the field, SAC is building an air-conditioned terminal of its own—plushest in the land. From its beautiful Skyview restaurant to its elegant lobby, lounges, and flight operations room, here is dynamic proof that business aviation Has Arrived. It will open this fall—and **you** are invited.





Pioneer Central Div. (Bendix), Pratt & Whitney Aircraft, Red Bank Div. (Bendix), Scintilla, Skinner Div. (Bendix), Utica Div. (Bendix), and Willard Batteries

1932 —A QUARTER CENTURY OF LEADERSHIP— 1957

Southwest Airmotive Co.

LOVE FIELD DALLAS

DIVISIONS: KANSAS CITY, KANSAS / DENVER, COLORADO

Just among ourselves

"Mister" Pete Quesada

A retired Air Force General, Elwood Quesada, has stepped into the important spot vacated by Edward P. Curtis as presidential assistant for aviation facilities planning in the White House.

Filling the shoes of the eminent and capable Ted Curtis is a mighty tough assignment but every indication points to the reality that President Eisenhower could not have picked a better man for the job than Pete Quesada in spite of his predominantly military background. Close friends and associates of Quesada are unanimous in the opinion that he just isn't the type to represent any one special interest or group over another.

Quesada is a cockpit airman, a pilot. In fact, he is generally recognized as one of the top fighter pilots of all time. Plus the fact he is a pilot's pilot. When you couple this with the assurance that he is completely objective in his approach to the facilities problem we believe that direction of the plans and programs now under way for modernizing our aviation facilities is in mighty good hands.

One of the most important feathers in Pete Quesada's new hat is the complete confidence and backing of his predecessor in high office, Ted Curtis, who also was a cockpit airman in the years gone by. All airmen, whether they be civilian or military, should be grateful that an administration lawyer, a professional politician or an electronics engineer wasn't picked for the job. But most impressive of all is Quesada's own request upon assumption of his new duties when he said, "We're all in this together so let's forget I was ever a general. Just call me Mister."

Speed Control

PROGRESS and improvements in aviation rarely come the easy, quick way. One of the enigmas of this business is the slowness with which improvements are accepted. Such useful and important safety and performance devices as flaps, retractable landing gear, the constant speed propeller and even the gyro instruments were a mighty long time in catching on. A contemporary enigma is why Dr. Leonard Greene's speed control instrument has been so long in finding acceptance by both manufacturers and airplane owners. His stall warning indicator was long enough in becoming accepted as standard equipment but his equally important speed control system seems to have met with even stiffer sales resistance.

There are favorable signs that this resistance is beginning to crumble. Military services such as the Royal Canadian Navy have set up speed control as standard equipment; also the Fairchild Company on its C-123B's and Cessna on the 620 Businessliner. More and more business airplane owners are beginning to equip their aircraft with the Safe Flight speed control system, principally on the light twins where slow speed control is so critical during an engine-out condition on take-off.

But this is only one of the many safety and performance features of the system which embodies sensing, computation and direct indication on a simple Slow-Fast instrument on the panel. By reference to the indicator you are able to tell directly what your wing is doing for you during approaches, landings, take-offs or any slow-speed maneuver under any load condition. Fly the pointer at center and efficient safe lift is being provided by your wing. If the aircraft is being flown too slowly, the needle moves to "SLOW"; if too fast, the needle moves to "FAST". Regardless of the type of maneuver, loading or configuration, you get a consistently calibrated indication of the correct speed range. By use of the instrument on take-off you get your most efficient climb-out speed.

Many pilots still make the mistake of glancing at the airspeed indicator as an index to minimum safe lift. They are reading into airspeed indication what actually isn't there. They complain about "lag" in airspeed indicators, which only measure velocity—miles per hour or knots. An airspeed indicator is not an acceleration instrument. When a pilot, during critical conditions, glances at his airspeed for trend information and doesn't get it, he blames the "lag".

Total weight for a single-engine installation of the speed control system is only 4.5 pounds. For a multi-engine craft it is only 6 pounds. So extra weight is not keeping the system out of so many airplanes.

We are firmly convinced that the speed control system should be standard equipment on all commercially produced airplanes. Analysis of accidents occurring in non-scheduled civil aviation loudly attest to the fact that lack of speed control still remains one of the biggest killers and damage doers. If we consistently refuse to improve pilot technique or to raise the level of general flight instruction in civil aviation then it becomes incumbent on the manufacturer to install in every new airplane a proven safety and performance device like Safe Flight Instrument Corporation's speed control system to help eliminate human errors of pilotage that make the scare headlines and seriously reduce the number of prospects for new airplanes.

The more we fly in airplanes equipped with the system the more we're convinced it soon will be standard equipment at the factories. As these columns have said before, safety in aviation is a dollar mark. Fortunately the people and companies who buy and use modern aircraft in the main don't quibble or compromise over the few extra dollars the best instrumentation available might cost in the long run.

These Aircraft Engine Experts are AT YOUR SERVICE

Continental's Factory Re-manufacture plan, successor to the periodic overhaul, backs you with the specialized skills of the men who know your engine best. With your factory re-manufactured Continental, you get new engine warranty—new log book with zero hours—at a modest, pre-determined price. Most important of all, you're back in the air with an absolute minimum of costly down time.

WHY NOT WRITE NOW FOR THE INFORMATION THAT CAN SAVE YOU TIME AND MONEY WHEN OVERHAUL TIME ROLLS ROUND AGAIN?

WHEN CHOOSING AN AIRPLANE, FOR PERSONAL OR BUSINESS USE, MAKE SURE IT HAS CONTINENTAL ENGINE . . . PILOTS' UNDISPUTED FIRST CHOICE.

Continental Motors Corporation

AIRCRAFT ENGINE DIVISION
MUSKEGON, MICHIGAN

AIR REPORT

(Continued from page 17)

troit. Illini also has distributorship for the Heron, priced at $250,000. The 14-passenger Heron cruises 183 mph. and has four small 250-hp. engines.

SALES OF AC AIRCRAFT SPARKPLUGS for the first 9 months of 1957 are up 136 per cent over sales for the previous year.

DEVELOPMENT OF A TURBOPROP ENGINE rated at 960 shaft horsepower has been ordered by the Air Force in a $4,268,000 contract issued to Lycoming. The engine is the T53, designed for helicopters but recently announced as powering Grumman's new twin-engine high-performance Army-Navy observation plane.

BEECH HAS DELIVERED six Model D18S trainer-transports to Rangoon for the Burma Air Force and five new supercharged E50 Twin-Bonanzas to the Morocco and Swiss governments. The first 15 of 90 T-34 Mentor trainers ordered by Argentina were delivered last month.

THIRD-QUARTER CESSNA SALES were 8 per cent ahead of those for the previous quarter and President Dwane Wallace expects last-quarter sales to boost the year's total sales to $69.5 million, about 5 per cent over those for the previous year. Commercial sales are exceeding original expectations, he said.

BELL HELICOPTER CORPORATION has an Army order for 42 more H-13H copters and is delivering three 47J 4-place Bells to the Brazilian navy in August.

Airmen's Calendar

Aug. 17—Piper Aircraft Co. Open House, Lock Haven, Pa.

Aug. 20-22—Bendix-Scintilla International Ignition Conference, Sidney, New York.

Aug. 30-Sept. 1—Kentucky Jaycee Air Tour. For information, write Frank Savage, Kentucky Jaycees, Fincastle Building, Louisville.

Aug. 31-Sept. 1—Midget Airplane Races, Ft. Wayne, Ind.

Sept. 15—Oakland Air Fair, Oakland International Airport.

Sept. 19-20—Airwork Aviation Operations Forum, combined with 8th Annual P & W Airwork Engine Forum, Airwork Corp, Millville, N. J.

Sept. 24-26—Annual Aviation Spark Plug and Ignition Conference, Secor Hotel, Toledo, Ohio.

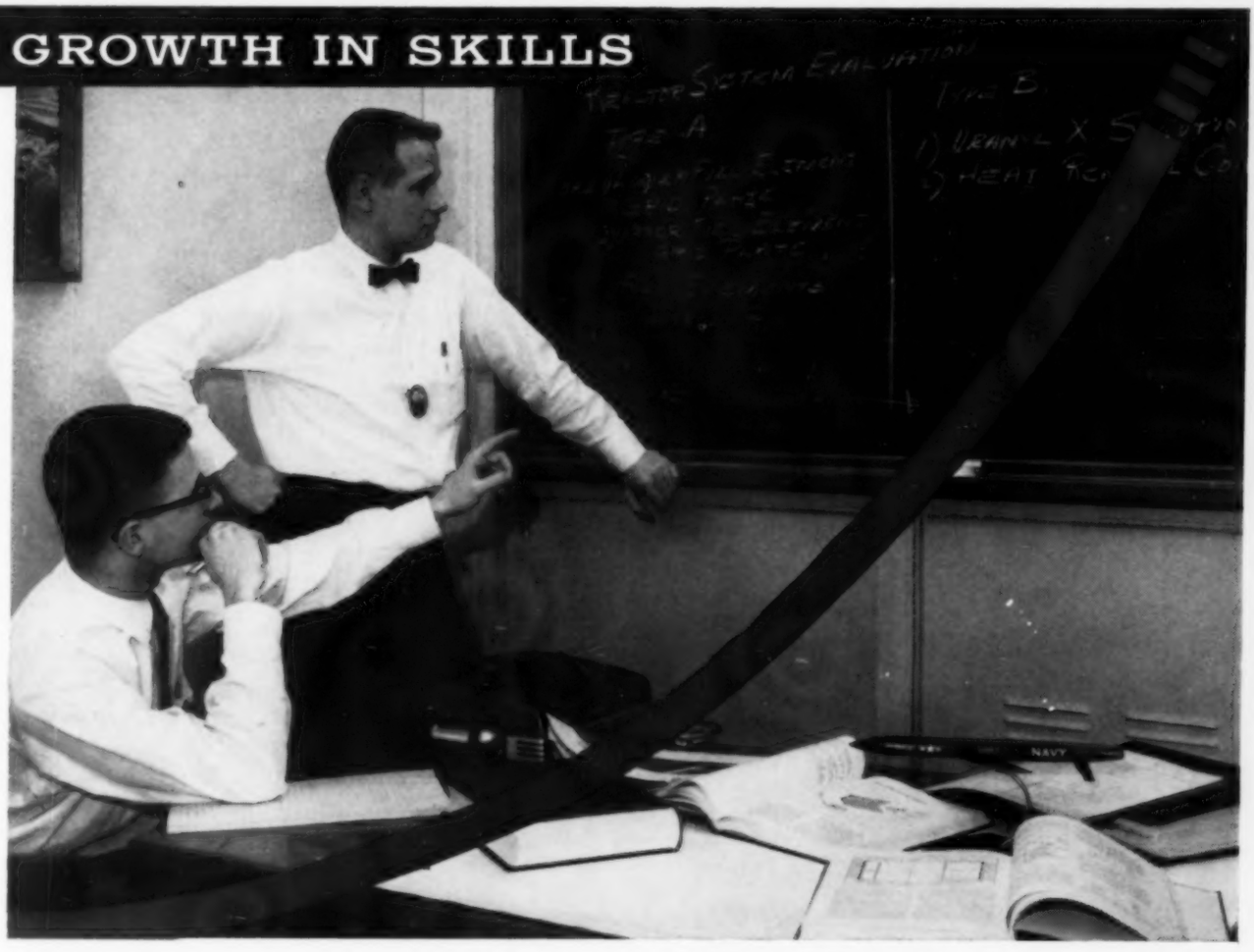
Sept. 25—P & W Southwest Airmotive Engine Forum and Pilots Party, Melrose Hotel, Dallas.

Sept. 26-27—5th Annual Michigan Aeronautics Conference, Alpena.

Sept. 30-Oct. 5—SAE National Aeronautic Meeting, Hotel Ambassador, Los Angeles.

Oct. 2-4 — 10th Annual National Business Aircraft Association Meeting, Cosmopolitan Hotel, Denver.

GROWTH IN SKILLS



At Temco GROWTH tells the story

Growth — in engineering skills, for example, tells the Temco success story.

In 1946, Temco was equipped to handle only four basic aeronautical engineering functions. Today, more than 150 different specialized skills are represented in the many groups that make up Temco's engineering departments. Included in this list are specialists in such advanced activities as nuclear engineering, operations research, electronics guidance and thermodynamics.

Similar growth in management and production skills has equipped Temco successfully to translate its own and other designs into jet aircraft, missiles and weapons systems.

This continuous growth of engineering capabilities is creating new opportunities month by month. If you are looking for a challenging opportunity in aviation, you'll find it at Temco.

Mr. Joe Russell, Engineering Personnel
Room 10-F7 Temco Aircraft Corp., Dallas, Texas

Please send me complete details of the Temco story of unusual opportunities for creative engineers. I am especially interested in _____

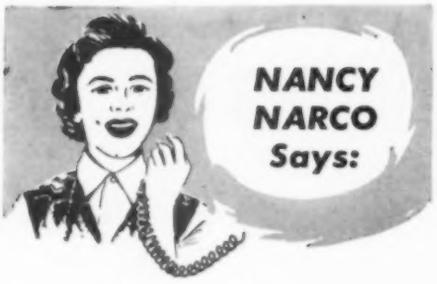
_____

NAME _____

ADDRESS _____

CITY _____ STATE _____

TEMCO
AIRCRAFT CORPORATION, DALLAS



Friend of mine just got his instrument rating after pecking away at it for the past three years and does he feel superior! He can't understand why everyone doesn't go out and do the same thing.

> Good idea, but how about that written work and the 40 hours of hood and Link time? This friend, who says IFR is the only way to go anymore, suggests "Just take the written, find out what you need to study, then go back and pass it." Probably a good idea, rather than putting it off like a dentist appointment.

Of course, lots of us don't ever want a rating, but how silly it is not to get some instrument time so you don't panic if you get trapped. Lots of guys are flying around with full gyros, without being able to use them — even primitively.

> Instrument practice is fascinating and simple. There are several good "blinders" which automatically convert your plane to an instrument trainer. Best, of course, to start out with good instruction, get the fundamentals and then try to make every cross-country flight under the hood. Any friend with a swivel-neck and a private ticket is legal as a check pilot.

You'll soon get the instrument "bug," and it gives you complete confidence in radio as the basic navigation aid, VFR as well as IFR. I've done some hood flying myself and I can tell you there's nothing so thrilling and self-satisfying as making a simulated instrument approach, counting off the minutes inbound from the low-cone, lifting the hood and seeing the runway a mile ahead, just where it ought to be.

> You hear lots of preaching about being able to make a 180-degree turn on instruments or keeping the plane straight and level in cloud. Makes too much sense to argue about it. Case in point happened recently when a brand new businessman pilot departed Harrisburg for Washington, in minimum VFR weather. He got halfway, ran into unexpected lower scud, had no choice because of hilly terrain but climb to 3000' in the stuff. He'd had only some basic hood time, enough to control the airplane.

Being tuned into the Washington TVOR he took a heading for DCA, radioed his plight. No approach plates, no approach practice, but the kindly controllers gave him directions and pretty soon he was below it all headed for the runway at Washington National. Without at least the rudiments of instrument training, this story might have had a different ending.

> How would you do in a situation like that?

Regards,

Nancy

NARCO • Fort Washington, Pa.

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More channels, increased transmitting power, tripled band width, whistle-stop tuning, increased speaker output—all these up-to-date features plus many others are offered in the sensational new Omnigator Mark II. Printed circuits plus the most advanced electronic refinements make all this added performance possible in the same compact single-package navigation and communications unit which has made the Omnigator the most popular, the most respected, the most accurate (proved by government test) of all popular business-plane Omnis.

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NO OTHER RADIO GIVES YOU SO MUCH IN A SINGLE, COMPACT UNIT

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LARGE SCALE COURSE SELECTOR permits accurate course selection to the exact degree.

IMPROVED COURSE INDICATOR with ideal sensitivity, combined with new type To-From indicator.

ILS LOCALIZER reception for instrument approaches.

75 Mc MARKER BEACON RECEIVER.

VHF RECEIVER 108 to 127 mc for crystal clear reception.

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BUILT-IN WHISTLE-STOP TUNING!

Pioneered by Narco four years ago, tunes your receiver precisely, positively to your transmitter frequency for simplex communications with towers, control centers, Unicom.

See your Narco dealer or write for new brochure.

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NATIONAL AERONAUTICAL CORP., FORT WASHINGTON, PA.

Desert Patrol

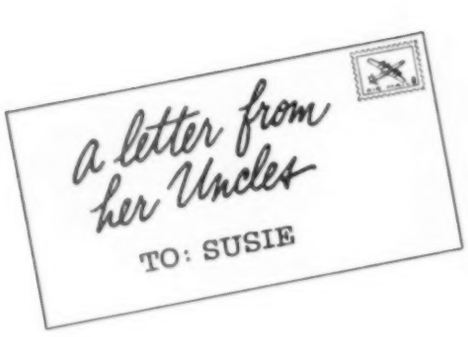
De Havilland Otters, manned by R.C.A.F. pilots, play a vital role in U.N.E.F. operations in the Middle East

Designed and built by

THE DE HAVILLAND AIRCRAFT OF CANADA LIMITED

POSTAL STATION "L" TORONTO ONTARIO

Western Sales and Service: Municipal Airport, Edmonton, Alta. - Pacific Coast Sales and Service: International Airport, Vancouver, B.C.



Dear Susie:

Our good friends at Southwest Airmotive have a party goin' on over at Love Field in Dallas -- a big birthday party -- so, sweetie, we want you to bake 'em one of those wondrous heavier-than-air cakes of yours, put twenty-five Roman candles on it (they sure look older than that), and trot your pretty little self over there with it. Tell 'em it's from the boys at Bendix and that we wish 'em as much future success as we've seen them enjoy up to now.

Quality is Southwest's middle name, you know, so you do an extra good job on the cake, honey, and get out all the lumps. Those wise old-timers down there just don't compromise with safety or craftsmanship which, as any fool can plainly see, has helped make 'em grow so big . . . from a half dozen employees to more than 700, from 20,000 square feet of floor space to nearly 300,000, from zero volume to $8 million!

So put on your bonnet, button up your high-tops, and get a-goin' with that SAC cake, sweetie. Stick to the ridges and come right home.

All your Bendix Uncles

BENDIX PRODUCTS **BENDIX SCINTILLA** **ECLIPSE-PIONEER**

BENDIX PACIFIC **BENDIX RED BANK**

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you're not still enroute...

you're
THERE
in the Super Ventura

Just as the automobile and train replaced the stagecoach, the Super Ventura is replacing the outmoded and slow executive airplane of yesterday. Yes, YOU are THERE not still enroute in the Super Ventura.

Get out of the Executive Air Stagecoach and Get into the finest, fastest and most luxurious Executive Airplane on the market today — the 300 mile per hour plus Super Ventura.

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For further information, write, wire or call .
BOB WOLIN, General Sales Manager

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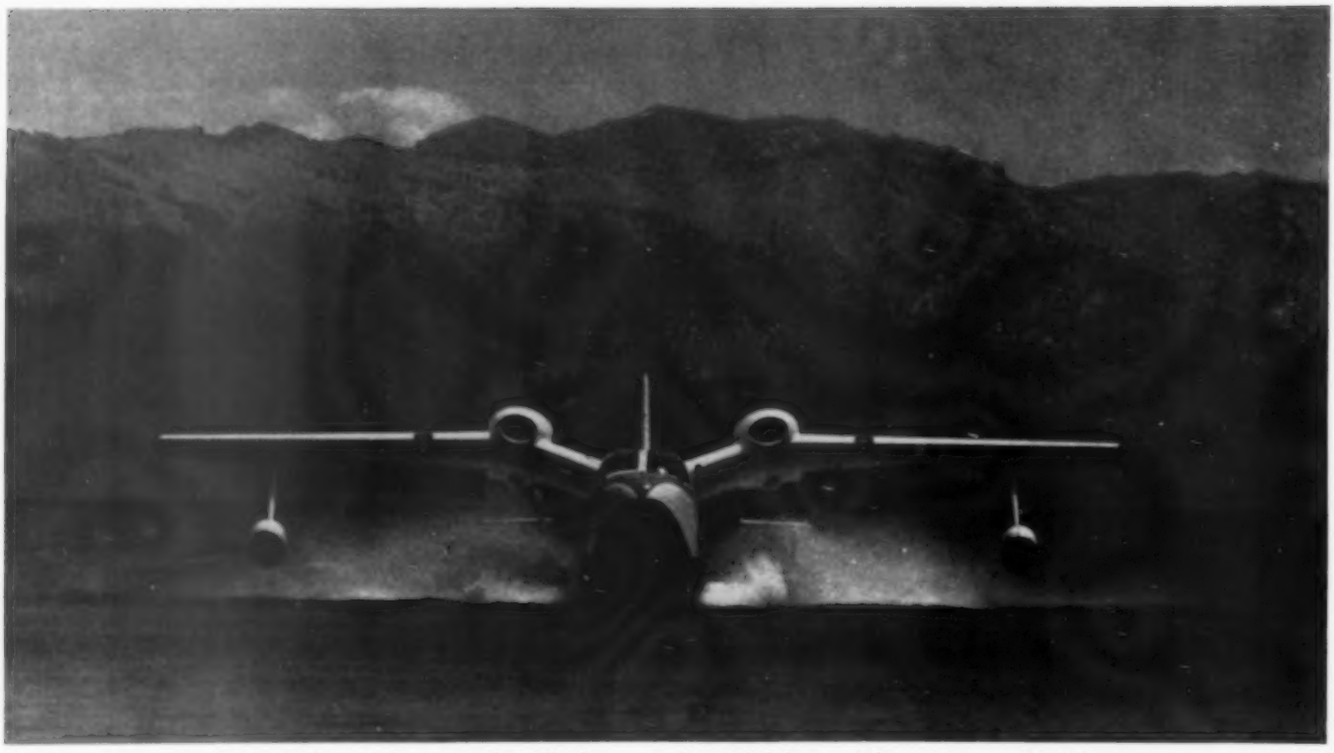


Head-on view of a Lake Tahoe Airline Royal Gull shows its beautiful lines. This is near end of landing run, with full flaps helping to protect pusher propellers from spray.

Lake Tahoe's Royal Gulls

By TOM ASHLEY
FLIGHT MAGAZINE PHOTOS

SOME years ago when the Aero Commander was new and pioneering the era of light twin-engine business planes, we covered a lot of the country with the original Commander factory sales manager, Carl Wootten. One of our trips to the West Coast took us over Lake Tahoe, the spectacular high-elevation Sierra-locked lake on the California-Nevada border. Little did we dream then of ever being able to fly up to Tahoe and land on its sky-blue waters, there being no boat equivalent of the Commander. But last month we did just that with Wootten, who is now sales manager for the Trecker Royal Gull. This remarkable twin-engine amphibian for business flying makes lakes, bays and rivers as convenient for landing as paved runways. The fascinating thing about our flying into Lake Tahoe, however, is that several thousand persons will do exactly the same thing this year in Trecker Royal Gulls, which have become commonplace in this sky-high wonderland.

Perfection of the high-performance Royal Gull makes the accomplishment possible — plus the courageous vision

Docked at New Chambers Lodge on Lake Tahoe, this Royal Gull is taking on a full load of seven passengers. Note door level, freedom from propellers. Photo at right shows west side of Tahoe looking south.

of Robert Law, whose Lake Tahoe Airline operates two Gulls on hourly schedules between San Francisco Bay and Lake Tahoe. The distance is about 150 miles, the time to fly it is one hour as compared to half a day by auto, and anybody can buy a ticket at $19.50 one way less a discount on a round trip. In the Bay area, all you do is show up at Bob Law's waterfront Sausalito seaplane base 3 miles north of the Golden Gate Bridge (15 minutes by auto from downtown San Francisco) any hour between 8 a. m. and 6 p. m. Or, if you are at one of the many summer homes or resorts up at Tahoe, just show up at Law's pretty little blue-and-white water's-edge ticket office at the New Chambers Lodge on the half-hour. He has sparkling new Volkswagen busses to pick up or deliver passengers who desire ground transportation at the lake.

Law's firm, Commodore Aviation, purchased the two Royal Gulls as standard 5-place amphibious business planes but converted them into 8-place flying-boat airliners by removing the landing gear for extra payload and installing 8 Cessna seats in place of the plush 5-seat standard interior. One of two 80-gal. fuel tanks was also removed, thus adding more payload for the one-hour trips. All told, the saving in weight was 900 lbs., so that the Gull's 6,000-lb. gross need never be exceeded even when carrying 8 persons plus 40 lbs. of baggage per passenger plus freight items such as daily newspapers and resort supplies. Empty weight for the standard airplane is 4,700 lbs. before the conversion. The old and new seating arrangements are like this:

Old	New
X X	X X
	X
X X X	X X
	X X X

The conversion was licensed without a hitch, for weight and balance and center-of-gravity travel were not disturbed even a fraction. As a boat, the Gull has to have extra width for proper displacement and hull design and its cabin is a generous 54 inches wide inside. It is also 96 inches long. With the amphibious gear, the main wheels retract into the fuselage sidewall, a wheel-well extending slightly into the cabin just behind the standard rear seat. With gear removal, this well was eliminated

Sequence photos at right show Royal Gull take-off at gross weight with 8 persons from Lake Tahoe's calm waters at 6,200-ft. elevation with air temperature at 75 degrees. Note clean break from water (top), gradual flap retraction while holding nose down to build up speed for climb-out. Gulls' base on San Francisco Bay is pictured below.

and faired over, restoring 54-in. width to the cabin for moving the 3-place seat rearward into the area formerly used for small baggage, accessible from the cabin. This created space between the front seats and the rear one for two Cessna aisle seats. Up front, the Gull's standard plush seats for pilot and co-pilot were replaced by the smaller Cessna seats on tracks and a third Cessna seat was installed between them but staggered rearward just far enough to provide leg room at the floor-mounted control pedestal. It makes a compact but comfortable cabin for the short hop, and the Gull's large windows provide plenty of visibility and light for the illusion of even more roominess. Extra windows were cut into the cabin for the rear seat. The Gull's main baggage compartment is the largest of any light twin and is located well behind the cabin. It was not disturbed by the conversion.

Everybody rides out in front of the high, gullwing, its pusher engines, 275-hp. Lycomings, being hidden from view and their propellers behind the wing trailing edge. Main purpose of the pusher installation is to move the propellers up and away from water spray. They also contribute to cabin comfort and quiet-

Lake Tahoe passenger station at water's edge is at left, one of its Volkswagen passenger busses at right. Bundles of newspapers are unloaded below from rear baggage compartment at dock level.

ness, there being no prop-tip drumming of air against the forward cabin sidewalls. These are the unsupercharged Lycomings. While Lake Tahoe Airline could use advantages of the new Super Gull with supercharged engines, it has no complaints for the 275's.

From take-off in San Francisco Bay, the terrain up to Lake Tahoe is a steadily-climbing slope. But with 8 people and at full load, the Gull is off the Bay in 18 seconds or less, climbs out at 500 feet per minute and 120-mph. indicated air speed and reaches cruising altitude only 30 miles from take-off. An altitude of 8,500 ft. is sufficient for the Gull to clear through a pass, and enables the Gull to cruise efficiently at 160 mph.

On our trip to and from California in a Royal Gull, we skirted mountain storms at San Gorgonio Pass near Los Angeles (left), 14,950-ft. Mt. Whitney, highest point in U. S., and nearby peaks (above) and Bishop Valley (right).

using about 65 per cent power.

This is one of the most scenic flights in America as the Gull cruises alongside sheer granite walls and peaks laced with snow even in mid-July. At the highest point in the Sierras, it seems, the peaks fall sharply away to create a huge volcanic bowl which is Lake Tahoe, its 30-mile length completely rimmed by steeply-rising tree-covered slopes. The lake is almost as deep as it is big, its icy depths running to 4,000 ft.

The Gull and its wide-eyed passengers are flown onto the sparkling lake at 80 to 90 mph. and faster and the thrill of the visitor's first water landing matches that of the scenery as the pilot holds the Gull off the water while heading toward the oncoming shore. He greases it on a few hundred yards out, timing his run to land his passengers at the dock with a minimum of taxiing.

So smooth is the technique that nobody pauses to reflect on the achievement this type of air service represents. Elevation of the lake is 6,200 ft. above sea level. But while we were there, daytime temperatures were up to 75 degrees. In August, the Gulls operate from Tahoe in 80 and even 85-degree temperatures, so that the effective altitude is far above 6,200 ft. as flying conditions go. The large size of the lake, however, offers unlimited take-off distances for the

(Continued on page 67)

Twenty Air Force student pilot officers have begun training in twelve twin-jet Cessna T-37 trainers at Bainbridge Air Base in Georgia. Some of the T-37's are pictured at the civilian contract school.

Student Switch to Jets

NEARLY everybody in the U. S. Air Force has been flying jets except student pilots, and last month the first of them began the switch from pistons to jets. The historical step was taken by the Southern Airways School at Bainbridge, Georgia, one of the Air Force's civilian contract training schools.

Twenty Air Force student pilot officers at Bainbridge Air Base will get 150 flying hours in the new Cessna T-37 jet trainer and 250 academic hours before graduating next March. The switch to the 400-mph. twin-jet Cessna is part of Project Palm, codename for the final phase of Air Force evaluation of the T-37 for its suitability for student training.

The 20 student pilot officers participating in the program represent a hand-picked cross-section of the class of students there. All have had 30 hours of training in the Beechcraft T-34 Mentor. Results of their training will be carefully studied and the Cessna T-37 will become the USAF's first standard jet primary trainer if the evaluation proves successful upon completion of the course next March.

The T-37 powered by two Continental J-69 turbojets of 920 lbs. of thrust each, features side-by-side seating for instructor and student.

In the Bainbridge Air Base project, actual student training in the Cessna will include 80 hours of contact proficiency flying, 20 hours of navigation, 15 hours of aerobatics and 35 hours of instrument flying. Academic training will include 20 hours of principles of flight, 44 hours of aircraft engineering, 16 hours of radio communication, 36 hours of physiological training, 50 hours of navigation, 15 hours of flight instruments, 15 hours of flight planning, 27 hours of weather, 15 hours of aural and visual code and 3 hours of flying safety.

First student pilot officer to fly with an instructor in the T-37 at Bainbridge was Second Lieutenant Thomas W. Beaghen, 23, of Mount Vernon, New York. He has been on active duty in the Air Force since last March and was assigned to Bainbridge for pilot training late in May. With him was Civilian Instructor Alfred K. Sluyter. Both described the jet as a "magic carpet" among trainers.

Jet interest is shown in the smiles of Lt. Col. Elmer Masters, Bainbridge Air Base commander, and Lt. T. W. Beaghen, first student pilot officer to fly the T-37.

First student pilot officer to solo a jet was Second Lieutenant James A. Riggs, Jr., 24, of Richland, Washington. He took it up alone after 7 hours and 10 minutes of dual in the T-37 and on his solo flight made two full-stop landings and take-offs.

The Bainbridge project marks the first time a using command in the Flying Training Air Force has been involved in the evaluation of a new type of aircraft. Lt. Col. Elmer L. Masters, Bainbridge commander, said he expects the T-37 training program to move along much the same as the base's program with Beech T-34's and North American T-28's. "We are simply switching from pistons to jets," he commented.

Responsibility for proving the airplane for its training mission lies with the Air Proving Ground Command, although the evaluation is being conducted in cooperation with the Air Training Command. Project Palm serves as an agent for the Air Training Command's Flying Training Air Force. The project was recently moved from the James Connally Air Force Base at Waco, Texas, to the Southern Airways School at Bainbridge.

Resembling the basic Bell helicopter design, the French Alouette II has its 360-hp. shaft turbine atop the fuselage structure near its 3-bladed main rotor. Fuel tank beneath rotor holds 157 gals. and turbine consumes 47 gals. per hr. at 110-mph. cruising speed.

Alouette in America

FLIGHT MAGAZINE PHOTOS

TWO French-built Alouette II shaft-turbine 5-place helicopters were demonstrated throughout the United State during May, June and July on an American tour sponsored by Republic Aviation Corporation, the jet fighter manufacturer. Republic has a licensing agreement for U. S. manufacture of the jet copters, developed by Sud Aviation, largest aircraft manufacturer in France. Republic and Sud last spring demonstrated the Caravelle, medium-range jet airliner, on an extensive American tour.

The Alouettes began their demonstrations in New York, were shown to military leaders on a tour of 8 Air Force, Army, Navy, Marine Corps and Coast Guard bases from New England to Florida, were displayed for the U. S. industry at the American Helicopter Society's annual convention and exhibits in Washington, and then were taken on a coast-to-coast demonstration junket. Hundreds of civilian prospects for commercial Alouette sales were given demonstrations.

Robert Suggs of Petroleum Helicopters, New Orleans, who pioneered commercial helicopter operations in Louisiana oil exploration and production servicing and is the world's largest copter operator, may become the first U. S. operator to purchase an Alouette.

"Turbine power is the answer to helicopter problems in many respects and the sooner we start operating turbines the more progress will be made in helicopters," Suggs told FLIGHT MAGAZINE. "The Alouette is a production machine and is being produced in quantity for military and commercial operators. I am impressed by its performance and its turbine advantages and have offered to buy one or both of the demonstrators which have been flown in America. I hope they accept my offer, as I would like very much to do my own evaluation of their commercial possibilities in our fleet of helicopters serving the oil industry in coastal Louisiana, where helicopters are indispensable."

No price was mentioned, but it was believed the Alouette would sell for considerably less than $100,000. In weight and performance, it is in the category of the 4-place Bell Model 47J, powered by a de-rated 260-hp. Lycoming piston engine and priced at about $65,000. President Eisenhower uses two Bell J's and the model is enjoying worldwide commercial sales and has been produced in quantity for the military here.

The Alouette II is powered by a Turbomeca Artouste II shaft turbine which develops 360 hp. for take-off with a 325-hp. rating for maximum continuous operation. It delivers up to 270 hp. for cruising at 10,000-ft. altitude and holds several altitude rec-

Close-ups show details of Alouette turbine, transmission and tail rotor installations.

ords, with a maximum ceiling exceeding 26,000 ft. Normal fuel consumption averages 47 gallons per hour and the Alouette's standard fuel capacity of 157 gallons gives it a range of 3 hrs. 15 mins. Cruising speed is 110 mph. and rate of climb exceeds 1,000 fpm.

With a 3,300-lb. gross weight, the Alouette II has an empty weight of 1,820 lbs. for a useful load of 1,480 lbs. Most of this is for the turbine's fuel requirements, the full capacity of 157 gals. weighing close to 1,100 lbs. and allowing only about 400 lbs. for pilot and payload.

However, turbine power offers several advantages even at the expense of high fuel consumption. The shaft turbine weighs less than 275 lbs. for a very high power-to-weight ratio, giving the Alouette impressive reserve power, especially at altitude. The turbine operates at 34,000 rpm. and this is reduced to about 6,000 rpm. for

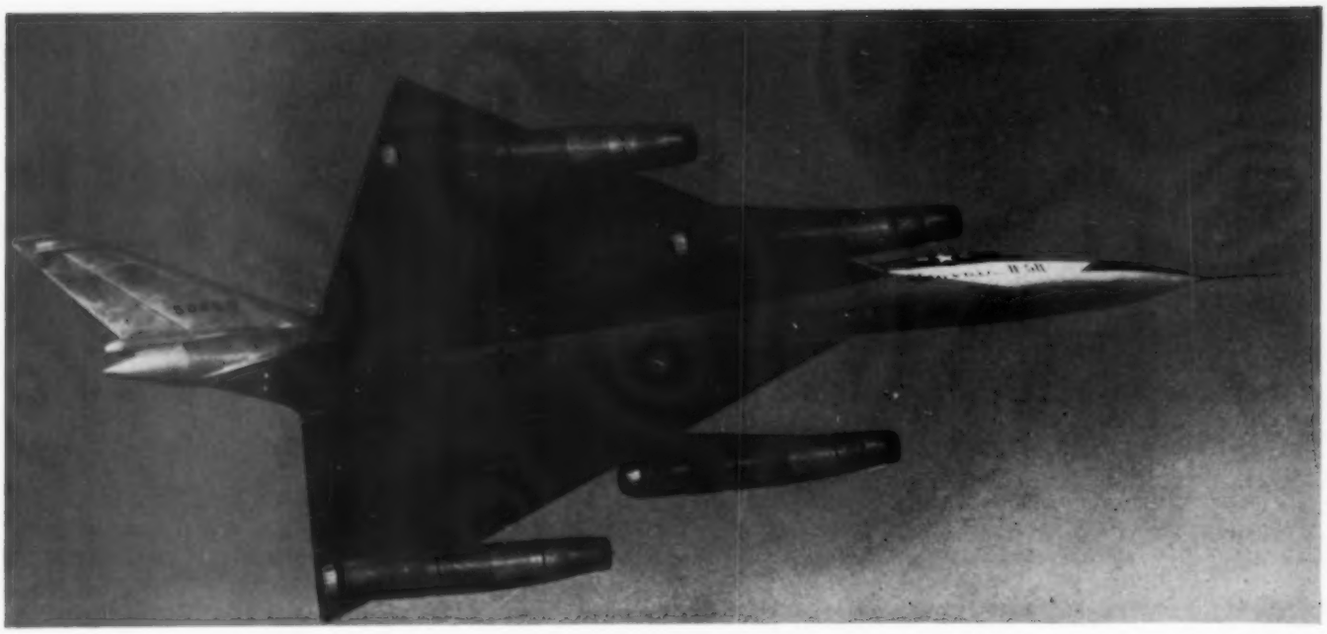
shaft output. The transmission reduces it to about 350 rpm. for the 3-bladed rotor, which has a diameter of only 33.5 ft. The turbine eliminates engine run-up and vibration and the Alouette features a governing system which eliminates the need for pitch-and-throttle coordination by the pilot.

In general configuration, the Alouette closely resembles the Bell design and is available with wheeled or skid landing gear. Accessories include hoist, litters and cargo slings.

Factory data issued by Republic Aviation and Sud Aviation for the Alouette on the American demonstration tour included the following:

Length, ft.-ins.	31-10
Width, ft.-ins.	7-4.25
Height, ft.	9
Rotor Diameter, ft.	33.5
Tail Rotor Dia., ft.-ins.	5-11
Gross Wt., lbs.	3,300
Empty Wt., lbs.	1,820
Useful Ld., lbs.	1,480
Cr. Spd., mph.	110
Rate of Climb, fpm.	over 1,000
Max. Ceiling, ft.	over 26,000
Fuel Cap., gals.	157
Fuel Consumption, gph.	47
Endurance, hrs.:mins.	3:15
Range, miles	345

Two of the 5-place, 3,300-lb. Alouettes are pictured giving demonstration hops to commercial prospects at Southwest Airmotive in Dallas. Among Texas pilots seated in F-WHOS here is Sam Willis, chief pilot for Magnolia Petroleum, which has a helicopter operation on the Gulf of Mexico.



Delta-winged Convair B-58 Hustler is in 1,200-1,500-*mph. class and symbolizes new trends in design, construction and equipment.*

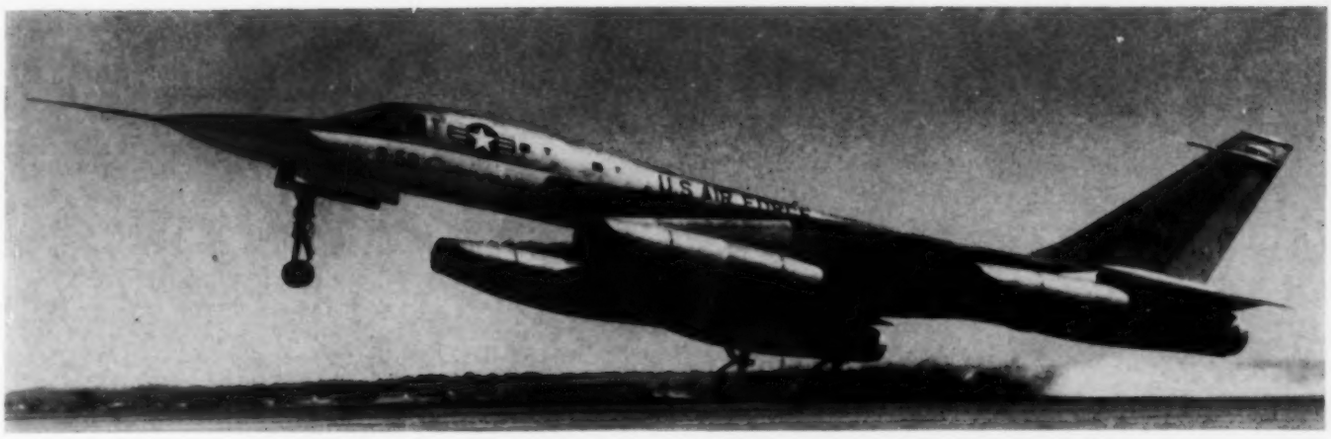
—(Convair Photo.)

More Than Speed Alone

CONVAIR and the U. S. Air Force proudly unveiled the world's fastest bomber at Fort Worth last month before the nation's aviation press. Old air soldier Lt. General C. S. (Bill) Irvine was on hand for the ceremonies to announce that the delta-winged B-58 "Hustler" outstrips in speed anything we or the Russians now have. No speeds were stated, but the B-58 apparently is good for 1,200-1,500 mph.

There were far deeper implications than high mach numbers in the release of more information about the B-58. The first public showing of this unique airplane brought home some important trends in aviation progress far beyond mere speed. First, the Hustler establishes a new peak of proficiency possible in and proves conclusively the great value of our weapons system concept and its corollary proposition of weapon system management. Second, the suppliers of special equipment are now co-equal with the airframe and engine builders and are no longer auxiliaries to them — their assignments and roles are integrated and conceived when the first drawing comes off the designer's board. We're through building airplanes and then going out and filling them up with whatever sub-systems and equipment might be available from the special equipment makers. Every component of the B-58 was built to mission capability. Third, such special development for a special mission weapon like the Hustler is bound to produce manifold good things for commercial aviation in the future. Structures such as the B-58's sandwich bonding of metal and fiber-

Note detachable pod beneath B-58's slender fuselage in this landing with brake parachute. Pods carry weapons, cameras, or other cargo.



Long-legged landing gear gives B-58 ground clearance for engine and weapon pods.
—(Convair Photo.)

glass honeycomb core between sheets of stainless steel or aluminum plate mean new accomplishments for lightness with exceptional strength and rigidity as well as resistance to fatigue from aerodynamic heating. Miniaturized and transitorized autopilot, navigational and communications equipment, the cooling system, the disposable or detachable pod, the delta planform of the wing, the multiple power supply system and even the wheels, brakes and tires—all have special significance in the rapid development of commercial jet transports yet to come. Surely the B-58 foreshadows this promise of progress.

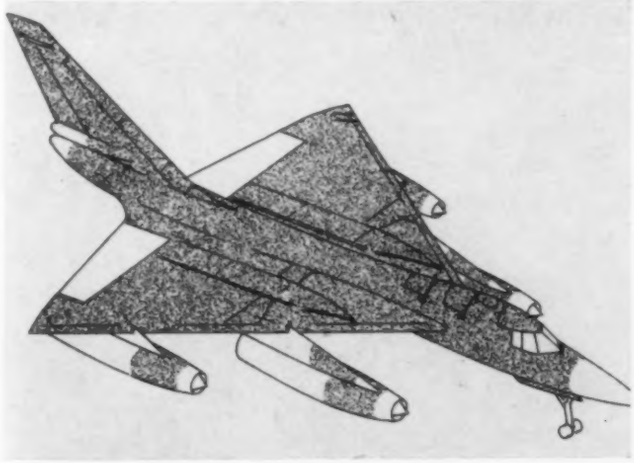
Even its four, 10,000-lb. General Electric J79 engines were tailored especially for the B-58. The J79 has variable stators on a single rotor, which in a mechanically simpler way and with less weight do the job of a dual rotor. The variable stators provide a smooth flow of air inside the engine at all speeds, thus eliminating the stall barrier problem. The pitch of the stator blades is controlled automatically to adjust air flow in the engine as the engine speed changes—an important factor in an airplane that calls for operations at both subsonic and supersonic speeds.

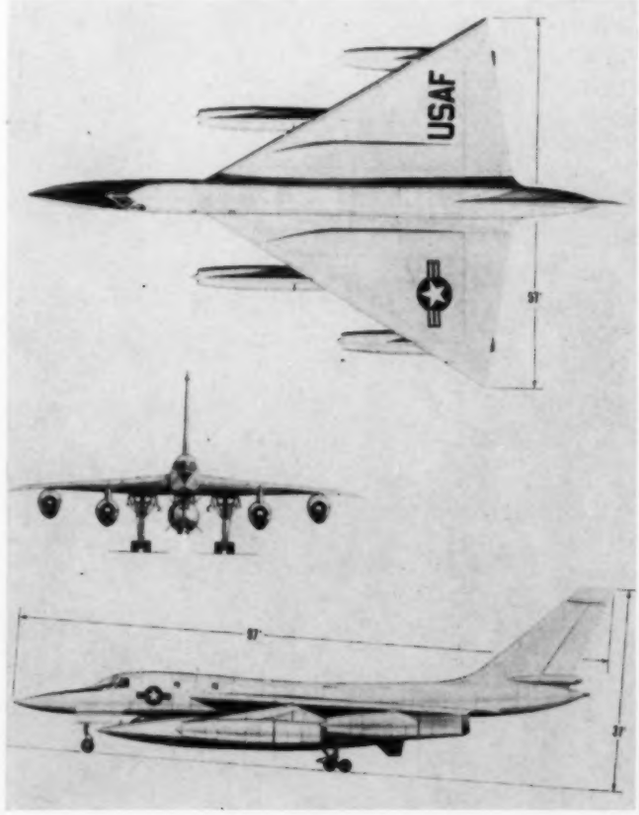
The needle-like, "coke bottle" or "cinched waist" fuselage carries beneath it an equally slim disposable pod that can be an atomic warhead, a battery of cameras or radar reconnaisance equipment, or a container for electronic counter-measures. Virtually an automatic airplane, the "Hustler" requires a three-man crew.

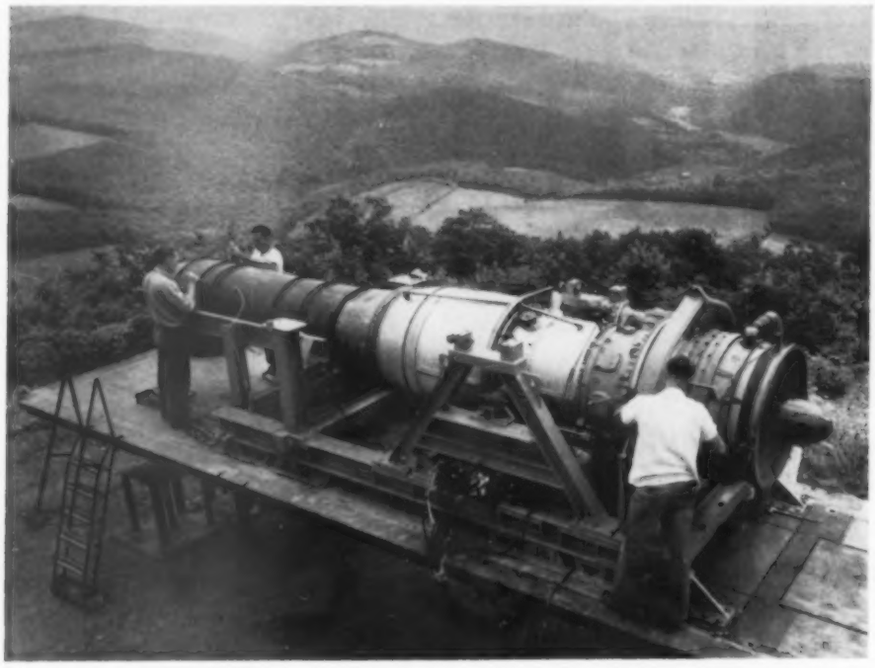
The B-58 is a successful attempt to reverse the trend toward larger and larger bombers, says Frank W. Davis, chief engineer at Convair-Fort Worth. "The magnitude of advance in the B-58 is best emphasized by the fact that it provides a greater increment in top-speed advantage over the latest operational bomber than that bomber provides over the Wright brothers airplane," Davis said, obviously referring to the B-52.

While specific speed ranges of the aircraft were carefully kept secret, it was obvious during the briefing on the B-58 that only the thermal barrier remains to check its speed capabilities.—G. E. H.

Dimensions in three-view sketch are 97-ft. length, 57-ft. span and 31-ft. height. Hustler's tandem-seated 3-man crew are pilot, navigator-bombardier and defensive systems operator. In sketch below, shaded areas indicate extensive use of bonded sandwich construction panels, which are rigid for shock and vibration, satin smooth and resistant to aerodynamic heating.
—(Convair Sketches.)







Curtis-Wright uses mobile engine test stand for Zephyr commercial jet, which weighs 3,600 lbs., is 121 ins. long and has 41-in. diameter.

Quiet, Please

By GEORGE E. HADDAWAY

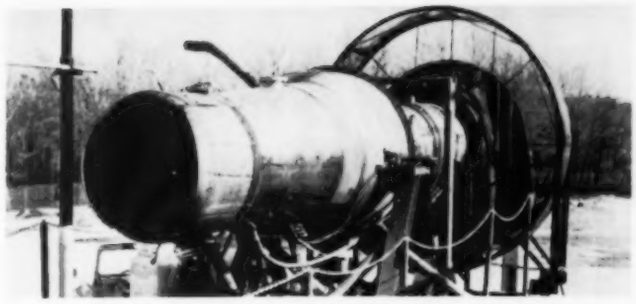
A trip to the Nevada desert near Reno last month convinced us that Roy Hurley, energetic and practical president of the far-flung Curtiss-Wright Corporation, is about the most noise conscious man in U. S. aviation. Perhaps his long experience with the Wright Aeronautical Division's engine test stands in a heavily populated district of New Jersey has had somthing to do with his sensitivity to noise. Whatever the reason, there are many harried municipalities and thousands upon thousands of landowners in airport terminal areas who will welcome with cheers and thanksgiving everything Mr. Hurley and staff are doing to produce a commercial jet engine that will operate in a tolerable noise range.

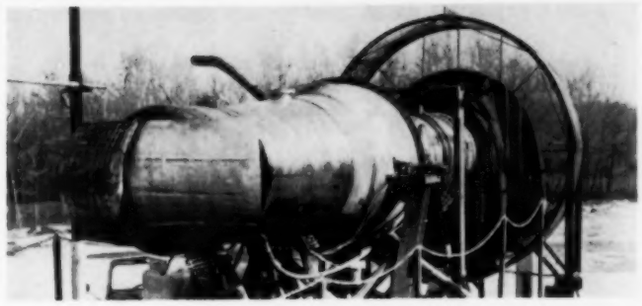
"We're not interested in nibbling on the noise problem," Mr. Hurley told us at Reno. "We intend to wipe it out completely as a major problem. You can't quiet down a military jet. Any attempt to do so results in compromise. All of us are going to hear a lot more about decibels in the near future with the coming of jet transports. Here at Curtiss-Wright we have developed the TJ38 Zephyr jointly with Bristol Aero-Engines of England during the past seven years as the first turbojet exclusively for commercial airlines — an engine that is quieter than current transport power plants and far below the noise levels of the current military type engines."

The Zephyr TJ38 turbojet, which can be put in commercial jet transports early in 1958, was demonstrated atop a Nevada hill on Curtiss-Wright land with special mobile testing equipment that permits run-up with no silencing or sound absorption equipment such as will be used on airports. With a decibel counter in hand we observed run-ups at four different positions. First site was 350 feet and 90 degrees from the engine. Here we recorded a 100 db. reading, which was a far cry from the reported 125 to 135 dbs. turned out by military turbojets. The second site was one mile away and 1,000 feet below. Third position was four miles away and 1,500 feet below the engine. Fourth position was three-quarters of a mile away and at the same altitude, which approximated being on a terminal airport ramp with the airplane

Mobile test rig includes operator's trailer with engine trailer. Zephyr ratings are 12,500 lbs. thrust at sea level for take-off and maximum continuous and 3,000 lbs. thrust at 36,000 ft. and Mach 0.8 for cruise, with fuel consumption of .706 lbs.-lb.-hr. for take-off and .88 for cruise.

—(Curtiss-Wright Photo.)





Curtiss-Wright thrust reverser is shown in pictures above and sketches below in forward and reverse thrust positions. Full modulation gives any percentage of thrust with full cycle operation taking less than 2 seconds.

at take-off point. We had to admit that the noise generated by the Zephyr was tolerable, even at the 350-foot distance. There was no background noise anywhere except at the four-mile point, on a public highway. According to the noise experts it is the super-imposition of jet noise on regular background noise that causes the public to complain. At the three-fourths-of-a-mile distance we were duly impressed by a reading of only 85 decibels, which is equivalent to the average noise in front of Rockefeller Plaza in mid-town New York.

We learned that every time you drop off six decibels you actually cut the noise in half. So if you achieve a cut from 100 dbs. to 94 you're making progress. But to cut from the 125 db. range to 100 only 350 feet away, as the Wright Aeronautical boys have done, you can really crow.

The noise level of a turbojet engine varies directly with the velocity of the gases leaving the engine. A special jet nozzle in the Zephyr spreads the exhaust over a 50-percent larger nozzle periphery in addition to the low jet velocity designed into the engine. Noise reduction is accomplished without loss in power or economy.

Mr. Hurley was quick to point out that the Zephyr is one of a long family of engines originally developed by Bristol in England, one of which recently passed acceptance tests with 16,000 pounds of thrust; that the Zephyr itself has had over 5,000 hours of flight and that it was definitely not a de-rated military turbojet. "It is completely 'Americanized' after five years of work on our part," he stated emphatically after a question as to why a British aeronautical journal had complained that it was not a cooperatively developed power plant but primarily a pure British product.

Since it was developed for commercial operations it is of simpler construction and of lower weight per pound of thrust and operates at lower temperatures with two-thirds the number of blades as used in comparable military engines. It weighs only 3,600 pounds. Water augmentation is not required because of its tremendous reserve power, thus cutting heavy weights of water and water equipment, maintenance of same and, because of low fuel consumption, a hypothetical saving of 11,000 pounds at take-off is claimed for a typical long-range jet transport using Zephyrs as against conventional military jets adapted for commercial use.

Mr. Hurley illustrated the economics of his case by taking an air transport airplane costing $5 million. Depreciation over a period of 7 years at an annual rate of $700,000 means a daily depreciation of $2,000. If the transport makes two transcontinental flights a day, the depreciation figures $1,000 per flight. So engine and airplane utilization become even more important in the jet age than in today's reciprocating engine aircraft. Hence reliability and low cost (i. e. weight saving and simplicity) have been Curtiss-Wright's principal objective in developing a turbojet strictly for the commercial operator.

With fuel costs running more than 40 percent of jet transport direct operating costs, it is understandable why fuel consumption is one of the most important factors in the over-all economics of jet air transportation. Operating some 300 to 400 degrees cooler than its military counterparts, the common problems of stress-rupture, thermal shock, thermal fatigue and distortion prevalent in the 1,600 to 1,700-degree temperature range are avoided. Low temperatures mean longer parts life and reliability.

The Zephyr is equipped with a special Curtiss-Wright thrust reverser, a fail-safe aerodynamic system for deflecting jet exhaust and producing effective landing roll reduction. Matched to the engine, the thrust reverser provides up to 60 percent reverse thrust and up to 30 percent reduction in landing roll on dry runways. On ice or snow-covered runways it is said to reduce landing roll as much as 70 percent.

The cooperative effort between Curtiss-Wright and the Bristol Company means that the engine can be manufactured in either country, which in turn paves the way for considerable savings throughout the world in view of standardization and parts availability. While the commercial sales program has just been inaugurated and no orders have been placed, there's little doubt but that Curtiss-Wright has come up with a sound approach to the knotty problems of noise reduction and operating economies, backed by a tremendous faith in the commercial market by designing an engine specifically for commercial operations.

EXAMPLES OF SMALL JET ENGINE WEIGHT LIFTING ADVANTAGES AND AIRFRAME SHRINKAGE . . . ON IDENTICAL MISSIONS.

Two available large jet engines

8 passengers—2 crew
Gross Weight: *45,000* lbs.

Four Small Jet Engines

8 passengers—2 crew
Gross Weight: *26,000* lbs.

Two Small Jet Engines

4 passengers—2 crew
Gross Weight: *16,000* lbs.

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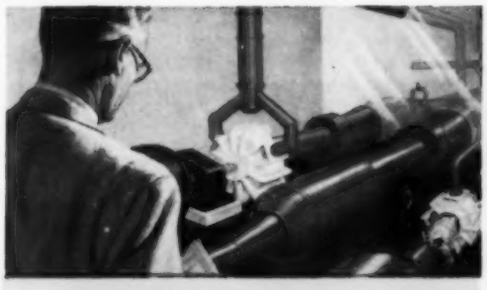
Best of all, the new small jets will make possible lighter, less costly aircraft with performance to match the big planes of today. With power/weight ratios as high as 8 to 1 and long range potentials of more than 10 to 1, the small jets may power lightweight fighters, basic and advanced jet trainers, transports of half the size with proportionate savings in weight and cost. As the new airframes shrink, their performance and especially their versatility and utilitv expand.

Performance and potential in a smaller package . . . this is the promise held out by the new family of small jet engines of the J83 type now under development and test.

Fairchild Engine Division has long been a pioneer in aviation and a pioneer in power and is dedicated to the small jet engine concept.



Test cell for the powerplants of tomorrow—a vital link in the chain of advanced research program at Fairchild Engine Division. Equipment, experience and design ingenuity—these are the elements in Fairchild's pioneering in small jet powerplants.

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WHERE THE FUTURE IS MEASURED IN LIGHT-YEARS!

Midway Tower at Chicago averages over 1,000 aircraft landings and take-offs a day. Left to right in the tower cab here are the watch supervisor, local controller, radar departure controller, B-position, who coordinates all activities with ATC, and ground controller.

—(Metro News Photo.)

World's Busiest Tower

By SHELBY M. KRITSER
President, Tradewind Airport
Amarillo, Texas

TO many airline passengers, Midway Airport, located some miles southwest of Chicago's Loop, resembles the midway at a carnival. In reality, it received its name from the famous Pacific Battle of Midway that was fought during World War II.

Midway holds the undisputed title of the busiest airport in the world. In the U. S., behind Midway in number of plane movements, are New York's LaGuardia Field, Los Angeles International Airport, Washington National Airport and Miami International Airport.

The spark plug behind the smooth operation at Midway is the airport traffic control tower, staffed and maintained every minute of the year by personnel of the Civil Aeronautics Administration. These young men direct by radio and monitor by radar all plane departures and arrivals in good weather and bad. When the visibility is less than three miles and/or the ceiling is less than 1,000 feet, the weather might be termed "bad" for these are the limits below which Instrument Flight Rules (IFR) prevail and above which Visual Flight Rules (VFR) are in effect within the control zone.

Because of the frequent weather minimums near the shores of Lake Michigan and due to smoke and haze, planes often operate in and out of the airport under IFR conditions.

The complement for tower personnel is eight senior controllers, 34 controllers, eight associate controllers, one chief controller and one secretary. Because of great air traffic growth, there are today only 20 controllers altogether with 25 people in training. The training and operations manual for this job includes some 400 typewritten pages. Too, because Civil Service regulates pay scale, openings at Midway for a controller are sometimes hard to fill. As one watch supervisor stated: "Why work your head off in the Tower here when for the same scale you can do less for about the same pay at a quieter facility?"

There were 372,177 plane movements in and out of the airport in 1956. Eighty-four per cent of these were scheduled airlines. Less than five a day were military. The Tower will handle an average of over 1,000 movements in a 24-hour period. The maximum has been 1,550 departures or take-offs in one day. An average of 25,000 airline passengers arrived and departed at Midway during every day of 1956. This does not include the military or other passengers who just passed through. There is an eight per cent increase so far in 1957, above 1956, in traffic volume.

In the upper level within the control tower, there are four men on duty at all times. The man in A-position handles all aircraft landing and taking off. B-position copies clearances from ATC (the Center), calls out depar-

(Continued on page 65)

Two Midway Tower radar approach controllers observe duplicate airport surveillance radar (ASR) scopes and talk to incoming planes. Man at center records aircraft position data. Precision approach radar (PAR) is at left.

—(Metro News Photo.)

business moves fast
in a Beechcraft Supercharged Twin-Bonanza

and Lear keeps it moving–weather or not!

SUPERCHARGED ENGINES give the new Twin-Bonanza more speed, greater range, and a big boost in altitude. Here is increased power to carry you more safely through weather or to rise above it. And it's here that having the finest navigational instruments really pays off. That's why the Beech factory provides LEAR equipment at your option. LEAR communications systems, automatic direction finders, omnirange receivers, marker beacon receivers, and automatic pilots are all available for this new executive Beechcraft.

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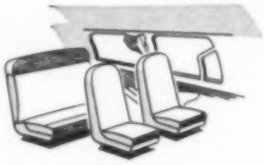

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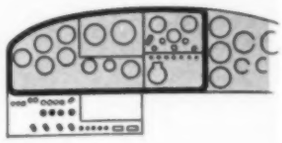
more usable cabin space
with scores of extras!

NEW
heavier windshield
and windows



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Now...a whole year ahead...the fast Cessna 310B for 19

Here's twin-engine flying's greatest comfort achievement—a completely new and roomier kind of cabin. It's sound-sealed and fully insulated... soft and spacious, to wrap you in restfulness, the whole quiet 213-* mile-an-hour ride!

*See specifications

It's the most advanced twin in the sky, this fast and beautiful new Cessna 310B.

Far more than just a "warmed over" model, it's truly next year's airplane here today, with all the advanced performance and safety features that have made the 310 famous—unequalled power per pound of weight, wing-tip safety tanks, superb "engine-out" dependability. And now, you get all this plus a completely new kind of cabin comfort!

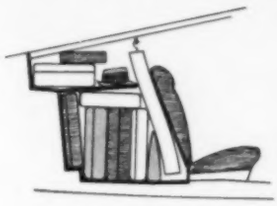
There's new quiet in the Cessna 310B, because its Comfort-Sealed cabin is completely insulated from floor to ceiling and all around; its windows and windshield double-heavy and vibration-free.

There's constant climate control with its brand-new heating and ventilating system that surrounds you with a soft flow of fresh, cooling air in summer—and in winter, blankets you in warmth from its "double-capacity" heater.

And there's real deep-cushioned comfort in its new and wider cabin—with extra room where you want it most! You can choose the fully adjustable all-in-one rear seat that tilts back for lounging at a touch, or optional

CESSNA 310B THE WORLD'S BEST ALL-AROUND LIGHT TWIN:

NEW
fully adjustable seats*
*separate reclining rear seats optional



NEW
giant 19-cu. ft.
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"double-capacity"
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NEW
fully retractable
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1958!—with the revolutionary "Comfort-Sealed" Cabin

separately reclining rear seats (comfort experts say they're the most perfect airplane seats yet). You also get such new and luxurious extras as rear-seat armrests, full-width magazine racks, and sparkling new fabric and color combinations. Front seats, too, are fully adjustable, softer and more relaxing than ever.

But all this is only the beginning! You'll see a new, more functional kind of instrument panel, grouped for easier I. F. R. flight, with new nonglare "post" lighting. A new, bigger baggage compartment. A new retractable double step to make getting in and out really easy. New, easy-opening cowling fasteners for quicker engine maintenance.

One look, one flight at your Cessna dealer's will prove it! This is the most advanced twin available today. He'll show you scores more new features, from an improved oxygen system to new and luxurious carpeting, a bigger luggage shelf, a better taxi light—even new giant-size ash trays!

The Cessna 310B is priced (with std. equip.) at $59,950 f.a.f. Wichita. See your Cessna dealer or write CESSNA AIRCRAFT CO., DEPT. FM-10, Wichita, Kan.

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General Aviation Facilities Requirements Survey

A report to the President's Special Assistant by the General Aviation Facilities Planning Group

Parts 3 and 4

Forecast of Future Aircraft and Equipment

EDITOR'S NOTE: The above-titled special report to President Eisenhower's special assistant for aviation facilities planning, Edward P. Curtis, holds such significance in the broad field of general aviation that FLIGHT MAGAZINE is publishing its full text. This survey of general aviation requirements was prepared and submitted by the General Aviation Facilities Planning Group, in which eleven national organizations banded together to document the important and growing field of general aviation (as distinguished from airline and military aviation). Special credit goes to them for the report, and to the well-known firm of Booz, Allen & Hamilton, which coordinated and directed the research studies. Part 2-A was published last month; the report will be concluded next month.

THE objective of this chapter is to set forth a forecast of those characteristics of future general aviation aircraft that are of primary interest to the facilities planner. Primary emphasis is placed on performance characteristics and on certain equipment characteristics. It is assumed that the extremes of the various performance characteristics by class of aircraft are more pertinent and important to the facilities planner than are configuration and other physical details.

The task of forecasting aircraft performance is not a particularly difficult one when based on logical growth and progression trends. At the same time, it is recognized that in any forecasting procedure an unanticipated combination of events or developments may have impact upon the accuracy of the results.

In approaching this task, the knowledge and experience of those individuals whose work is to design airplane engines and aviation equipment have been fully utilized. Consideration has been given to actual units now in the preliminary design stage.

After the basic information was gathered from a number of sources, practical judgment had to be applied to the results. For every characteristic to be forecast, there are individuals or groups who take an extreme position in one direction or another. In most cases, these extreme positions were based primarily upon the technical aspects of the situation. In assembling a realistic forecast, it is essential to recognize that design trends depend upon many factors in addition to technical factors, including market conditions, consumer desires, economics, safety, etc. The judgment factor in forecasting involves the weighing in of these factors.

The performance data presented here are felt to be on the conservative side throughout. Fringe performance characteristics of special designs have not been shown. The determination of what are special designs has been primarily based on whether or not significant quantities of such units will be in existence.

Future Engine Characteristics

Because of the importance of power plants to the performance characteristics of airplanes, it seems appropriate to present brief comments on this subject.

Many airplanes in the 1976 fleet will be powered by reciprocating power plants not materially different from current models. Today's reciprocating airplane power plants are examples of highly refined machinery design. The rate of improvement in terms of fuel economy, performance efficiency and weight reduction has been modest in recent years. It should be anticipated that this modest rate of improvement will continue for a number of years in the future. It is anticipated that there will be a tendency toward increased use of fuel injection and of the application of controllable and variable pitch propellers. These changes will tend to improve the performance of the airplanes in which the engines are installed. It is also expected that there will be an increase in the number of engines equipped with superchargers, particularly in twin-engine airplanes. This will increase the performance of these airplanes at higher altitudes.

Costs per horsepower in reciprocating engines will continue at approximately the current level in today's dollars.

Turbine power plants will also be in service in the 1976 general aviation fleet. The prices of today's turbine engines are high. Compared to reciprocating engines, turbine engines have low fuel efficiency, particularly at low speeds and at low altitudes. Fuel efficiency problems are much more pronounced in turbojets than in turboprops. It is generally agreed that the price and fuel efficiency of turbine engines will be materially improved as time goes by. The degree of usage of turbine engines in general aviation aircraft at any given time depends greatly upon how fast and how much improvement is achieved in these areas.

Future Performance Characteristics

Table 56 (see page 47) compares the envelope of extremes of performance characteristics of the general aviation fleet in 1966 and in 1976 with 1956. This, of course, includes not only those airplanes produced in the years mentioned but all of the airplanes that will be in the active fleet at that time in significant quantities.

It is possible that the definitions of current aircraft classes will be considerably less applicable in 20 years than they are today. However, to be of most use to the facilities planners, it appears to be essential to break

(Continued on page 47)

Jack Herlihy (C), Vice President of Engineering & Maintenance, and William C. "Red" Mentzer (R), General Manager of Engineering, discuss precision operation of UAL's San Francisco Maintenance & Engineering Base with Fisher (L).

Another in a series on the care taken by leading airlines to maintain top flight efficiency—and why this care has led them to select

CHAMPION SPARK PLUGS

Noted aviation authority reports on United Air Lines...

"Red Carpet" On The Mainline

By HERB FISHER
international aviation authority, veteran test pilot, author

United Air Lines' Red Carpet service means luxury all the way—the Mainliner way.

The flying Red Carpet fleet is aloft 1,700 hours a day, safely covering 380,000 miles every 24 hours.

Last year, United flew more than 6 million passengers along its 14,000 miles of routes serving 80 cities in the United States and Hawaii. More than 4 million people enjoyed Mainliner first-class service while almost 2 million rode United's comfortable coach flights, both the last word in safety and dependability.

To the aviation industry, safety and dependability are more than words. They're goals for achievement. And when I visited UAL's San Francisco Engineering and Maintenance Base, I saw the inside operation that makes safety and dependability a red-carpet fact for the No. 1 coast-to-coast airline.

"Here we do all the heavy maintenance," Jack Herlihy, Vice President, Engineering and Maintenance, told me, "and our first objective is to achieve the maximum humanly possible in safe aircraft for the traveling public."

Under the direction of a dynamic trio – Mr. Herlihy; W. C. "Red"

Mentzer, General Manager, Engineering; and W. P. Hoare, General Manager, Maintenance — engineering and maintenance personnel combine to guarantee top operating efficiency of United's 180 aircraft. All old friends of mine, these three men and their dedicated staff are a driving force there at the SFO Base.

HERB FISHER

I spent several days at this 128-acre maintenance base fronting on San Francisco's International Airport. There wasn't a section of the million square feet of floor space I failed to see — hangars, overhaul docks, shops, test cells, storage and stock areas, service and training headquarters, office buildings, even the aircraft run-up pads — all of it comprising a "push-button" maintenance base that's recognized as one of the most modern and complete in the nation.

From a small, split operation at Oakland Airport and Cheyenne, Wyoming, in 1941, United has mushroomed with atomic impact in the aviation industry. With today's maintenance operation centered at San Francisco, total UAL investment in buildings at year-end stood at $17,210,900, with 5,677 employees on a $31,789,662 payroll — just at San Francisco alone.

Current maintenance-hangar construction will boost United's San Francisco investment to $24,495,-900 by June of 1958.

Each year, hundreds of skilled mechanics, technicians and craftsmen work with engineering specialists to overhaul 250 to 300 aircraft and more than 1,500 engines. Maintenance standards and procedures are rigid.

On a precise schedule of preventive maintenance, each UAL Mainliner and Cargoliner is routed to San Francisco for progressive overhaul. This is planning at its best. It is one of the most perfectly synchronized operations I've ever seen.

A Mainliner is assigned a hangar. Ten minutes after being squired into position, it is literally caged by catwalks, frameworks and platforms. Powerful jacks lift the plane. Overhead cranes move in to support engines while they're dismantled. Control surfaces, instrument panels, wheels and brakes, seats, buffets and all other removable components are "pipelined" to their respective shops. Metal workers, X-ray specialists and inspectors move into the stripped fuselage to probe for metal fatigue, corrosion and wear.

Meanwhile, the giant engines have gone into the Powerplant Section, where they're steam-cleaned, torn down, and part-by-part chemically washed and minutely examined, in strict conformance to United's rigid specifications.

After engine reassembly, valves are adjusted, timing is set and test cells are readied. There, with the deft care of surgeons, specialists check each engine pulse to doubly assure perfection before mating the engine with three others to form the safe and dependable power package of a UAL Mainliner.

"Dependability is of such great importance," Red Mentzer told me, "that we cannot afford to use a

Fisher discusses extensive flight testing of reconditioned aircraft with (L/R) Robert M. McIver, Test Pilot; W. E. "Dusty" Rhoades, Flight Engineering Manager; and Robert C. Collins, Test Co-pilot.

"Usually, where statistical data blames spark plugs for ignition system troubles, we find the spark plug is the victim and not the cause," reports Bill Pitt, Line Service Engineering Manager.

"Rule of Five" sign points up safety, passenger comfort, schedule performance, honesty, sincerity. Pictured are (L/R) Fred Page, Maintenance Division Manager; H. R. Williams, Powerplant Manager; Hadley Queen, Maintenance Manager Assistant.

second-rate product any place in our operation.

"Take spark plugs," said the top man in Engineering and 24-year UAL veteran. "We've been using Champions as standard equipment on all of our airplanes for more than 10 years. We've tested many different types of spark plugs during that time. We've found, however, that Champion has developed its product more rapidly than anyone else. Result is – since we've used Champions we've enjoyed the best over-all ignition experience of our entire history."

As Jim Goodart, a maintenance expert in Line Service Engineering, put it: "We have yet to find one engine failure caused by a Champion Spark Plug. With these DC-7 engines costing about $120,000 each, the importance of product reliability is obvious. Sometimes a spark plug is blamed for trouble when actually it is not at fault. We've found that Champion is the best we could possibly use."

Harry Taylor, Superintendent of Powerplant Engineering, said: "We've always emphasized dependability, long life and economy. We feel that no other spark plug has thus far provided us with a full measure of these requirements."

Frank H. Griggs, buyer in United's Purchasing Department for 19 years, calls it business integrity and forward thinking on the part of Champion.

Just as a good airplane is the composite idea of designer, builder and user, so is development of a spark plug largely the result of cooperation between manufacturer and user.

One of United's technician engineers, Thomas Preitkis, told me this: "United has attended Champion Ignition Conferences every year for the past seven. There, airline operators get together with Champion engineers to discuss their problems. The result of such meetings is a spark plug that meets the needs of the airline operator, a spark plug offering greatly improved performance . . ."

Dependability the Champion way is 1,000 hours of service. New spark plugs are installed in UAL's Pratt & Whitney and Curtiss-Wright engines and, after 500 hours of operation, they're removed by line maintenance people and returned to the base for reconditioning. Then they're put in service for another 500 hours.

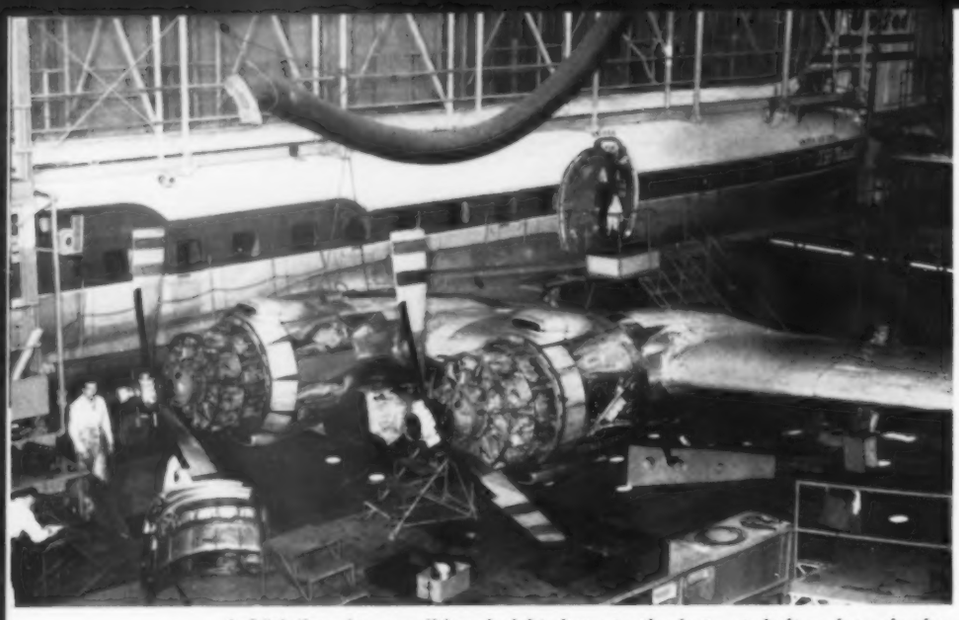
"In terms of operating costs," Bill Pitt, Manager of Line Service Engineering, told me, "Champion has been able to extend the time between spark plug replacements so that we are now realizing as high a time as any airline in the industry. This represents a saving in direct man-hours and in less frequent need for overhauling or service . . ." Mr. Pitt began his career with United 27 years ago as a cleaner and has progressed through all levels of mechanical maintenance. He speaks with authority, then, on economy and dependability.

"Actually, the spark plug is one of our finest tools for evaluating combustion chamber irregularities, such as burned pistons and valves," Mr. Pitt said. "By careful study of the electrode end of a spark plug removed from a malfunctioning engine, we've determined actual cause

Describing tests of all kinds of spark plugs and reasons for using Champions exclusively the past 10 years are (L/R) Harry Taylor, Powerplant Engineering Superintendent, and Frank H. Griggs, Purchasing Department Buyer.

Planning precise scheduling for aircraft overhaul are (L/R) W. P. Hoare, General Manager of Maintenance, and G. E. Keck, Assistant to V.P. of Engineering and Maintenance.

Earl Koehler (L), Champion Representative, gives technical assistance to Tom Preitkis (C), Powerplant Engineering Assistant, and A. G. "Hap" Gronenthal (R) of Spark Plug Maintenance.



A Mainliner is reconditioned right down to the last nut, bolt and spark plug.

of the trouble and avoided some rather destructive engine failures."

General Manager of Maintenance – Mr. Hoare – emphasized UAL's success with Champions: "United's experience has demonstrated Champion's consistently dependable performance under widely varying operating conditions," said the 30-year UAL veteran.

Those who occupy the "front office" of the airplane itself, those who bear the final responsibility for safe operation of the aircraft in flight, have the deep personal appreciation of the meaning of reliability. United's Flight Test Section employs 15 experienced pilots and flight engineers. During a hangar flying session with these test pilots, I learned just what Champion does mean to them.

Robert M. McIver, a Test Captain for UAL, said: "My experience dates back to 1933 and includes some 10,000 hours' flying time, 6,000 of it flight testing. We have a tremendous sense of moral responsibility toward each airplane we release, since we realize each plane will cover millions of miles under all kinds of conditions before returning again for overhaul.

"Part of our job, then, is to devise exhaustive tests for each component of the plane, and these tests we carry out religiously. The work of Flight Test is the end point in a long line of maintenance and inspection procedures, and we have authority to fly each plane as much as necessary to insure the ultimate in quality. Each component must fall within very tight tolerances before it can be considered satisfactory. Naturally, the engines and their accessories are subject to very close scrutiny . . . and spark plugs fall into this category.

"During each flight test, our flight engineers observe spark plug performance continually by means of ignition analyzers, and pilots do likewise indirectly by means of the instruments on the power panels.

"Using this instrumentation, we've been watching the performance of Champion Spark Plugs for 10 years. The excellent characteristics of these spark plugs have become not just a matter of personal opinion, but a matter of statistical record. We can summarize that record by saying that Champions meet the tough requirements of an airline operation and are backed by a good service organization . . . "

Captain McIver's comments were seconded by UAL Test Pilot Robert C. Collins, who told me that so far as he knew no other spark plug has ever come close to replacing Champions at United.

UAL's record of safety and dependability reflects the reliability of the heart of its aircraft ignition system, the Champion Spark Plug.

Red Carpet means *the finest*. To millions of passengers it means the ultimate in reliability, service and comfort. In a Mainliner, it means the ultimate in engineering and maintenance.

When you fly United, you're flying *Red Carpet*.

by HERBERT O. FISHER

Cabin view of Curtiss-Wright simulator, which electronically duplicates flying characteristics of DC-6B Mainliner, shows United crew solving flight problems "inserted" by instructors. UAL has seven of these – largest number owned by an airline – for advanced pilot training.

Harold McCray calibrates with fluxgate compass transmitter.

Unique with United is this special briefing room with a 14,000-mile view. Specialists brief company executives in Denver every morning on system-wide airline operations for past 24 hours – plus a forecast of the next 24. This contributes to constantly improved service.

GENERAL AVIATION

(*Continued from page 42*)

down the data in this manner.

Class I Aircraft: It is anticipated that there will be Class I turbojet-powered airplanes in the general aviation fleet within the next five years. Primarily because of cost factors, the number of such airplanes produced by 1976 will be modest. It is also anticipated that there will be Class I turboprop-powered airplanes in the general aviation fleet in five years or less. There will be a continuous growth in the proportion of turboprop-powered airplanes produced, and in 20 years the majority of this class of new airplanes will be turboprop-powered. However, in 1976 there will still be a significant number of reciprocating engine-powered airplanes in the general aviation operating fleet.

The cruising speed of airplanes will continue to increase to a 1976 maximum in the magnitude of 600 miles an hour for turbojet-powered planes and 400 miles an hour for turboprop-powered planes. The minimum cruising speed for Class I airplanes will be reciprocating engine-powered planes and will be in the magnitude of 230 miles an hour. Minimum stalling speeds and take-off and landing runs will tend to be reduced from today's minimums. Service ceilings of turbine power planes will be considerably higher than those of reciprocating engine-powered planes. In general, rates of climb and descent will be increased. Rates of descent will be controlled primarily by the comfort of the occupants and, thus, will be materially different for pressurized and nonpressurized aircraft. The increase in the number of supercharged reciprocating engines and in the use of turbine engines will result in many more planes in this category being pressurized.

Class II Aircraft: Present-day specifications and preliminary design work on twin-engine turbojet airplanes indicate that virtually all such planes will be of a weight and power size that will move them up to Class I airplanes. Therefore, by definition there will be no Class II turbojet-powered airplanes.

Class II airplanes will tend to pass through a progression from standard reciprocating-type engines to supercharged reciprocating engines and then to turboprops. In 20 years the big majority of the production of Class II airplanes will be turboprop-powered, but the operating fleet will include many reciprocating engine-powered planes. Both supercharged engines and turboprop engines will encourage higher flying. Therefore, more airplanes will have pressurized cabins and many of the remainder will be supplied with oxygen.

Cruising speeds will increase to a probable maximum of 350 miles an hour for turboprop planes and 250 miles an hour for reciprocating planes. Minimum cruising speeds will be approximately 130 miles an hour. There will be a minor decrease in stalling speeds and landing and take-off requirements. The turboprop model will have materially higher service and operating ceilings, and there will be increases in the rates of climb and descent.

Class III Aircraft: Class III airplanes will tend to have a very broad make-up of performance characteristics. The trend during the years will be toward turboprops, but in 1976 there will be standard reciprocating, supercharged reciprocating, and turboprop-powered airplanes. The combination will result in cruising speeds ranging from 250 miles an hour to 125 miles an hour. It is possible that there will be single-engine, turbojet-powered airplanes in 1976, but the number of such units compared to the total number of Class III airplanes will not be significant and the performance characteristics of such an airplane are not included here.

Reciprocating engine-powered airplanes in general will be lower in performance characteristics, cheaper, and, in general, will carry less equipment than turboprop-powered planes. These differences show up also in the take-off, service ceiling, range and rate of

Table 56

COMPARISON OF PERFORMANCE CHARACTERISTICS BY AIRCRAFT CLASS

1956-1966-1976

Class of Airplane (Type)	Cruising Speed (mph.)			Stalling Speed (mph.)			Gross Weight (Pounds)			Take-off Over (a) 50-Foot Obstacle (Feet)		
	1956	1966	1976	1956	1966	1976	1956	1966	1976	1956	1966	1976
I (Large multiengine)												
Maximum	315	500	600	100	100	100	50,000	——	——	4,700	4,500	4,500
Minimum	180	220	230	85	65	50	9,300	8,000	6,500	1,540	1,300	1,000
II (Light twin)												
Maximum	210	280	350	70	65	60	6,300	7,000	7,500	1,400	1,400	1,400
Minimum	150	150	150	52	48	45	3,100	3,000	3,000	1,000	900	800
III (Single engine, 3 place or more)												
Maximum	190	220	250	57	55	50	3,000	3,500	5,000	1,650	1,500	1,400
Minimum (b)	100	115	125	49	45	35	1,800	1,800	1,800	900	750	600
IV (Single engine, 1 or 2 place)												
Maximum (c)	130	180	220	45	45	50	2,000	2,800	3,500	1,000	1,100	1,200
Minimum	90	90	90	38	35	35	800	800	800	600	600	500
V (Helicopters)												
Maximum	140	180	200	—	—	—	33,000	33,000	33,000	——	——	——
Minimum	60	60	70	—	—	—	2,300	2,400	2,500(d)	——	——	——

Class of Airplane (Type)	Range (Miles)			Service Ceiling (Feet)			Rate of Climb Feet/Minute		
	1956	1966	1976	1956	1966	1976	1956	1966	1976
I (Large multiengine)									
Maximum	3,000	3,200	3,500	30,000	35,000	45,000	2,500	3,000	6,000
Minimum	1,100	1,000	1,000	23,000	24,000	25,000	1,500	1,500	1,500
II (Light twin)									
Maximum	1,300	1,400	1,600	22,000	25,000	28,000	3,000	3,400	3,700
Minimum	750	750	750	18,500	18,000	18,000	1,200	1,300	1,500
III (Single engine, 3 place or more)									
Maximum	1,000	1,000	1,000	20,000	26,000	28,000	1,300	1,800	3,000
Minimum(b)	410	400	400	12,500	13,500	15,000	700	700	800
IV (Single engine, 1 or 2 place)									
Maximum(c)	550	700	1,000	19,000	26,000	28,000	1,000	1,400	2,600
Minimum	350	350	350	12,800	13,000	15,000	400	600	700
V (Helicopters)									
Maximum	500	500	600	——	——	——	——	——	——
Minimum	90	150	200	——	——	——	——	——	——

(a) Take-off over 50-foot obstacle equivalent to some landing measurement. (b) Does not include Custer Channel Wing, Helio Courier, etc.
(c) Maximum excluding dusters, sprayers, etc. (d) Two-place enclosed model.

—General Aviation Facilities Planning Group Survey

climb characteristics.

Class IV Aircraft: Class IV airplanes will be powered with lower horsepower turbo and reciprocating engines.

A great many of these airplanes will be produced for training and recreational purposes, and low original cost and operating economy will be key factors. In general the airplanes in these groups will have the lowest performance characteristics of all the airplanes in the general aviation fleet.

It is also anticipated that there will be a significant number of higher performance one and two-place airplanes which will have larger engines and costs will not be such a significant factor. These airplanes will tend to have the top performance characteristics of this class. The basic difference in usage concept accounts for the spread between the maximum and minimum in flight performance characteristics.

Class V Aircraft: Because of the short history in the use of helicopters and the small number of helicopters in the present general aviation fleet, it is difficult to forecast the future of these devices. At this time the initial price and the high operating cost of helicopters are very restrictive factors. Generally, it is assumed that reasonable progress will be made in the solution of these problems and, again, the speed and amount of such progress at any given period will be a determining factor in the public acceptance of general aviation helicopters.

This class would also include VTOL and steep gradient aircraft, although the incidence of such aircraft in the 1976 fleet is not estimated to be a significant factor in facilities planning.

Helicopters used in general aviation will tend to be medium and small size, mostly in the four-place category and not exceeding 12 places. Cruising speeds will be increased and will vary from 90 to 180 miles an hour.

It is worthy of special note that rates of descent will generally be controlled by passenger comfort rather than maximum capabilities of aircraft. Therefore, general aviation's unpressurized aircraft will always require rates of descent substantially less than those possible in pressurized airline aircraft.

Future Aircraft Equipment Trends

Over and above the minimum essentials, various kinds of equipment are placed on airplanes for convenience of the pilot, to extend the utility of the airplane, and to increase the safety of flying. In general, airplane owners have shown a surprising willingness to expend money for units of equipment that make a real contribution in one or more of these categories. Current buyers, except possibly in the minimum performance Class IV airplanes, are demonstrating this tendency. Practically all Class II and III airplanes are equipped with navigation and landing lights, electric engine starters and a two-way radio. A high per cent are also equipped with VOR units and at least minimum IFR instrumentation.

The future purchases of radio navigation and instrument landing aids depend upon the programs and publicity of the governing bodies with respect to these types of facilities. Both the users and the manufacturers of such equipment are interested in what the future programs and systems are going to be. Assuming that current facilities are maintained and that transition to new systems are handled in a planned and reasonable manner, the utilization of radio communication equipment, electronic navigation equipment and other instrument equipment in the general aviation field will continue to increase.

The following comments, which are presented in somewhat the same sequence as the data in Table 6 of Chapter I, are of particular interest here.

IFR Instrumentation: The proportion of airplanes in Classes II, III, and IV that will be equipped with IFR instrumentation will increase modestly—somewhat in proportion to their current utilization in the respective airplane classes.

Communications units: The tendency will be for all airplanes—except a few that are used strictly for local flying—to be equipped with a two-way radio. The usage of present and improved models of the popularly used types of radio equipment, particularly the multichannel VHF two-way communications units, will continue to grow.

Autopilots: Autopilots are being improved every year. They are a real help to a pilot particularly in a one-pilot airplane—allowing him to properly handle navigation activities—and also for assistance in instrument flying and instrument letdowns. The increase in the proportion of planes equipped with autopilots will increase substantially in all four classes.

Direction finders: Both manual and automatic direction finders in their present general configuration and price brackets have apparently reached a saturation point in the general aviation fleet. New equipment, possibly in the combined direction-finding and distance-measuring field, will tend to reduce the proportion of these units in the future.

VOR omni: VOR or an improved type of direction-indicating equipment will be used in increasing quantities in all four classes of airplanes. An economical distance-measuring combination unit would have great appeal.

ILS localizer and glide slope: This is specific instrument approach equipment, and there will be increased usage of such equipment throughout the general aviation fleet. The prior comments made relative to the programs and policies of governing bodies refer particularly to this equipment and to the VOR and DME categories.

Airborne radar: This is a field that has great safety implication. In spite of some recent setbacks, it is the opinion of many that the aviation electronics industry will rise to this challenge through the years—and will develop practical, dependable and relatively economical units. The utilization of these units will filter down through the classes of airplanes as the complexity and price of these units are reduced.

Altitude equipment: As has been previously indicated, the use of supercharged reciprocating engines and of turbine-type engines will provide considerable impetus to increasing today's altitude patterns. Some general aviation airplanes will have pressurized cabins, but weight, complexity, and cost considerations will tend to limit these to Class I airplanes.

In nonpressurized airplanes, there will be a need for oxygen to meet the needs of flying at over 10,000 feet. Ingenious and practical oxygen systems, both built-in and portable, are currently used in a few general aviation airplanes. However, it should be anticipated that the proportion of planes equipped with oxygen will increase to allow the pilots to avail themselves of the higher speeds and low fuel consumption at higher altitudes.

In summary, the numerical estimates and ideas set forth in this brief chapter are the balanced composite of the opinions of many informed individuals. With this background, the next chapter presents forecasts of the numbers of airplanes, the amount of flying, and the patterns of flying for general aviation.

PART IV
General Aviation Operations in 1976

THIS chapter develops a forecast of general aviation operations in detail and by specific pattern for a period 20 years in the future. The specific development of the forecast is aimed to provide planning data necessary in setting the future requirements for general aviation facilities as these physical facilities themselves are developed by the planners.

Presenting the ZEPHYR

The recent demonstration of the new Zephyr jet engine for commercial transports, at the Curtiss-Wright Research and Development Center, Quehanna, Pa., created many requests for data on how this engine works.

• The Zephyr was developed in England by Bristol Aeroplane Co., Ltd. in collaboration with Curtiss-Wright. It has had 30,000 test stand and 5,000 flying hours. It is the first engine designed specifically for subsonic commercial jet airliners, all others to date being designed primarily for military use at supersonic speeds.

The Zephyr develops 5 lbs. thrust per lb. of weight. Its turbine and combustion areas operate several hundred degrees below other jet engines—therefore are not subject to thermal shock and fatigue, creep, or distortion. The resultant long, trouble-free life provides for high utilization, without the penalties the military accepts to get all-out performance.

The Zephyr's "cool engine" design gives lowest possible fuel consumption at cruise. It uses just half the fuel of other jet engines at idle, because of lower idle speed.

The Zephyr's "quiet engine" design gives 20% slower jet gas exhaust, through a larger nozzle. Also, a fluted noise suppressor breaks up the noise-generating and carrying capacity of the jet by producing air shearing over a 50% larger periphery in the nozzle—without reduction of engine performance.

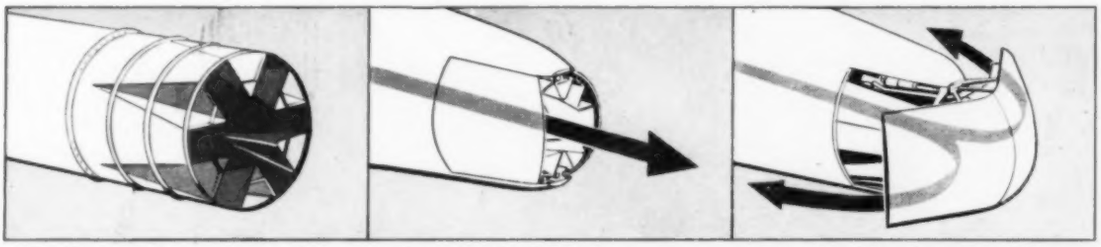
The Zephyr is fitted with a thrust reverser that cuts dry runway stops 35%; icy runway stops 70%. The reverser permits higher altitude approaches, plus air braking for more direct and quiet landings. Full power for emergency go-around is instantly available.

Zephyrs in a modern jetliner will result in a 10,000 lb. reduction in takeoff gross weight, 3,000 lbs. lower fuel consumption New York to Los Angeles. A fleet of 10 Zephyr-powered planes should use $500,000 less fuel yearly. Water injection and related apparatus are not required. The Zephyr's performance *has been matched* to jet transport requirements, and permits takeoffs from any principal U. S. airport, regardless of temperature and altitude.

The Zephyr's designed-in quietness will not disturb the community as do military type jet engines.

Due to low temperatures, hot-end replacements should be reduced $10,000 per engine yearly, and the increased reliability will provide high utilization with resultant increased earnings.

The Zephyr meets the needs of the airlines to a greater extent than any jet powerplant, and is designed to win the full acceptance of both industry and the public.



The fluted noise suppressor of the Zephyr makes a quiet engine quieter. Noise is below current transport engines, and far under military jets.

The new Curtiss-Wright thrust reverser is installed around the noise suppressing nozzle and does not affect engine power or performance

In closed position, the reverser deflects gases forward to shorten landing runs as much as 70%—permitting operation from existing runways.

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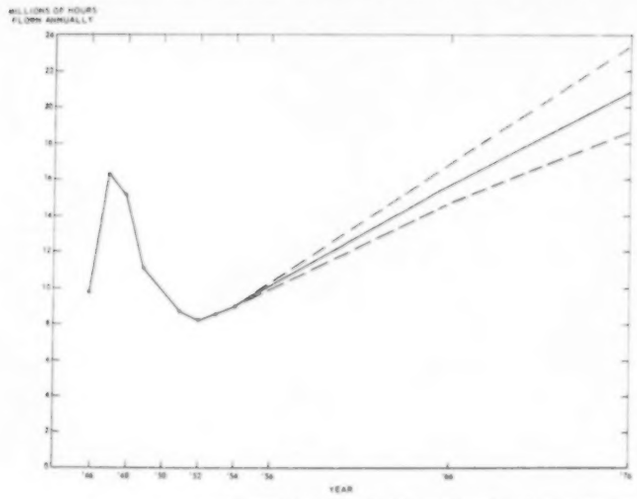
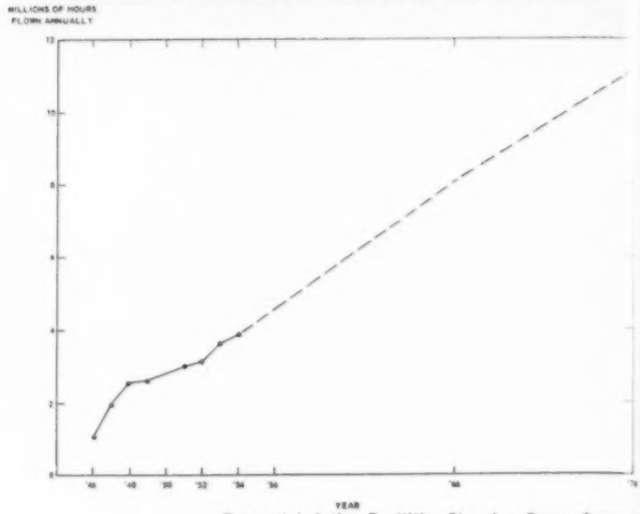
Table 57
FORECAST OF TOTAL GENERAL AVIATION FLYING



—General Aviation Facilities Planning Group Survey

Table 58
FORECAST OF BUSINESS TRANSPORTATION FLYING



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The following assumptions have been accepted as established by the President's planning group as guides for all forecasting: no global war to occur but international tension to continue, with periodic local incidents; United States continues vulnerable to enemy attack; population increasing to about 210 million to 220 million by 1975; gross national product to increase to about $715 billion to $740 billion in 1955 dollars by 1975; defence expenditures maintained at a level between $30 billion to $40 billion per year in 1955 dollars.

Only the two general assumptions concerning population and gross national product have direct implication in the forecasts of this chapter.

In addition, however, an important assumption is made necessary to the development of this forecast. It is assumed that no heavily limiting restrictions in the way of legislation or air traffic control regulation will be made and that aviation facilities will be provided so that general aviation can continue its normal growth.

The general sequence of the estimate is first to develop the number of flying hours of the general aviation fleet, then to forecast the composition of the fleet necessary to generate these hours, and then to break down the operations of this fleet into the various patterns of operation.

20 Million Hours Annually by 1976

It is estimated that in 20 years the total annual hours flown by general aviation aircraft will approximately double the present annual rate. This projection, together with reasonable maximum and minimum variations, is shown in Table 57.

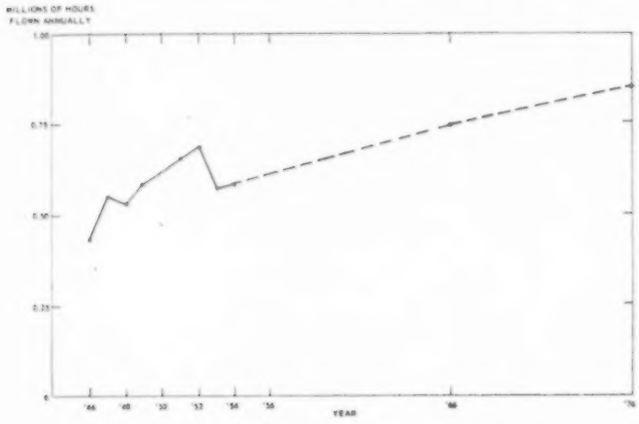
This total projection of future hours flown is a summation of independent projections made according to the purpose of aircraft usage. Each of these subprojections is presented in separate tables following the summary projection.

Business transportation flying will reach approximately 11 *million hours per year by* 1976. Table 58 presents the business flying projection to 1976. By this time it is estimated that over half of the hours flown will be primarily for business purposes.

There seems to be little doubt that the greatest major increased usage in the general aviation fleet will come from business flying activities.

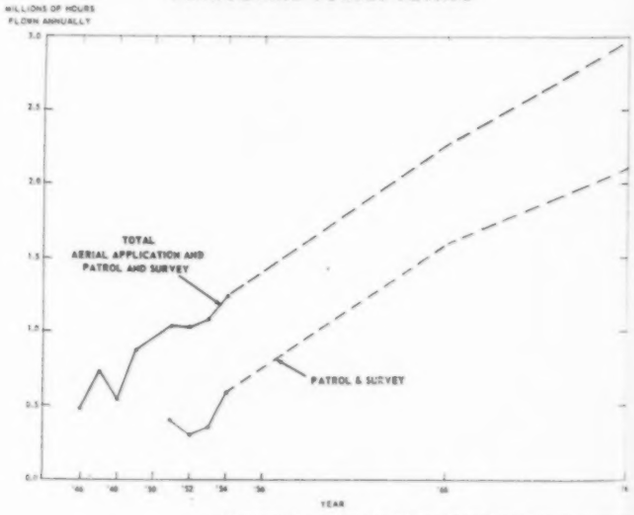
As an indication of the magnitude of this general aviation business flying, it should be noted that these hours, extended by fleet mix and passenger load factors, would generate over 5 billion business passenger miles, whereas in 1954, it has been estimated that all air and first-class rail business passenger miles in the 100 to 1,000-mile

Table 59
FORECAST OF PASSENGER AND CARGO FOR-HIRE FLYING



—General Aviation Facilities Planning Group Survey

Table 60
FORECAST OF AERIAL APPLICATION AND PATROL AND SURVEY FLYING



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Mr. W. C. White, Vice President of the Brown Aero Corp., is shown discussing the heavy operational schedule of the Magnolia 680 Super Commander with Mr. R. G. Sanders, Vice President of the Beaumont refinery, Mr. Sam Willis, chief pilot, and Mr. Jim Mathews, pilot, of Magnolia Petroleum Company.

"I need an airplane for a 2,000 mile round trip tomorrow, Sam, and I would like to have the 'fast one'." This request has become quite familiar to Sam Willis, chief pilot for Magnolia Petroleum Company, since the new 680 Supercharged Aero Commander was added to their fleet.

"The top level executives of our company are looking for FAST, SAFE, AND COMFORTABLE transportation, and our 680 Commander is by far the most popular airplane in our fleet," says Sam Willis.

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Table 61
FORECAST OF INSTRUCTIONAL FLYING

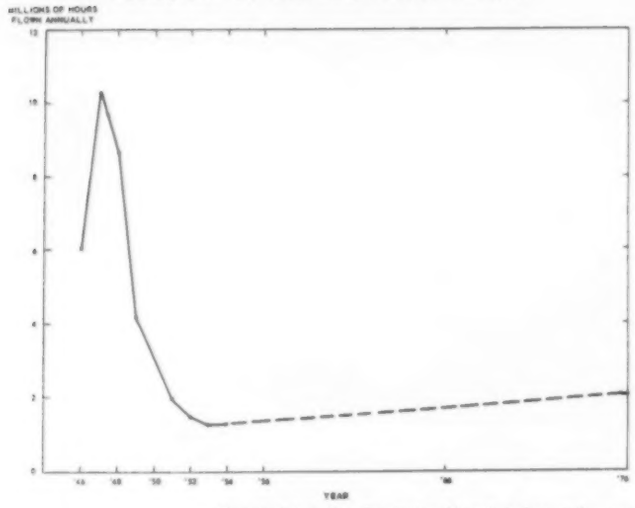

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Table 62
FORECAST OF NON-BUSINESS AND MISCELLANEOUS FLYIN

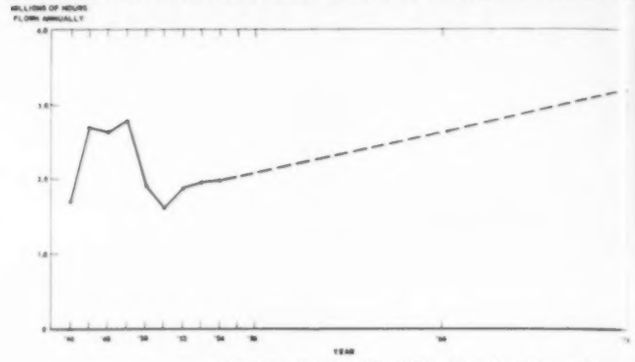

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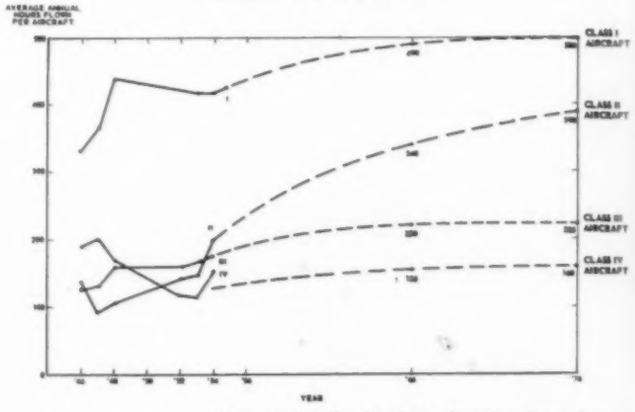
Table 63
FORECAST OF ANNUAL UTILIZATION FOR AIRCRAFT CLASSES



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range were about 12 billion. If past experience in travel versus gross national product ratios holds (and they have been relatively stable for some years), this total would rise to about 21 billion passenger miles by 1976.

In other words, the business fleet in its normal operation in 1976 would supply about one quarter of all first-class business transportation at ranges of from 100 to 1,000 miles. (The total lift capacity and actual passenger miles generated by the business fleet would be much greater—but we are speaking here of mileage for business purposes in the most conservative, restricted sense.)

Passenger or cargo flying for hire will increase to approximately 870,000 *hours by* 1976. Table 59 presents the estimated growth of passenger and cargo flying for hire. To a considerable degree, this presents an addition to the business flying hours. However, the growth in this area is not anticipated to expand as rapidly since a substantial portion of such carrying for hire will continue to be transferred to the self-owned planes of the business fleet as this fleet expands.

Patrol and survey flying plus aerial application flying will total almost 3 *million hours by* 1976. Table 60 presents the estimates for future growth of flying in the patrol and survey and aerial applications categories. A more than normal growth is considered probable, based upon past trends and future opportunities to expand aircraft usage, particularly in the patrol and survey areas.

Instructional flying should reach slightly over 2 *million hours annually by* 1976. Table 61 presents the forecast for instructional flying through 1976. It should be pointed out that this growth in plane usage is somewhat less than that anticipated throughout the fleet, but is predicted upon the fact that instruction is related to numbers of pilots in training and that these pilots, when trained, will join a pilot population which each year is flying more hours per pilot.

Nonbusiness and miscellaneous flying will rise to slightly over 4 *million hours annually by* 1976. Table 62 presents the estimate for growth in the field of nonbusiness flying as well as some minor miscellaneous uses. This rate of growth as forecast is slightly less than the over-all growth of general aviation flying, which is influenced so dramatically by the anticipated growth in business flying.

The actual growth in nonbusiness flying is related to population and income factors, with the economic factors probably posing the most severe restriction upon growth. This estimate is based on the assumption that prices for planes suitable for nonbusiness flying will not change their pattern substantially during the next 20 years and that the economic resources available to individuals to own and operate their own planes will follow established income trends.

Some additional perspective in this economic picture serves to emphasize the restricting factors on private individual plane ownership. A 1954 survey put the median income of individual prospects for new aircraft at $25,000. Only about 300,000 families have such an income, and the heads of about two-thirds of these families are over forty-five years of age and at a point where personal interest and aptitude in flying falls off. Without going into details of estimate, it appears that perhaps as many as 350,000 families will have the income and be at an age level to encourage private plane ownership in 20 years. The fleet makeup, here anticipated, requires that more than one in ten of these families own their own plane.

These income trends and the resultant economic limitations on plane ownership have been developed in an earlier Booz, Allen & Hamilton survey. The projection in flying hours here developed is consistent with the earlier economic research results.

More Annual Utilization Per Plane

Recent past trends and future predictions of usage all point to the fact that each year the average aircraft is flown more hours. Table 63 presents estimates of this annual usage increase through the year 1976.

It should be noted that when an aircraft is dependent upon a single regular pilot to fly it and that pilot is available full time, the annual hours flown by that aircraft tend to reach a utilization limit of about 500 hours per year. This is not to say that some

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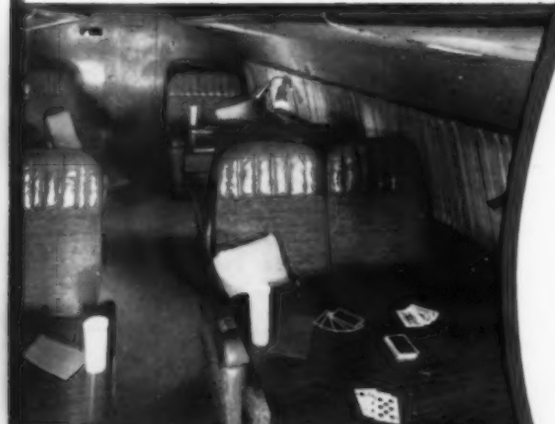

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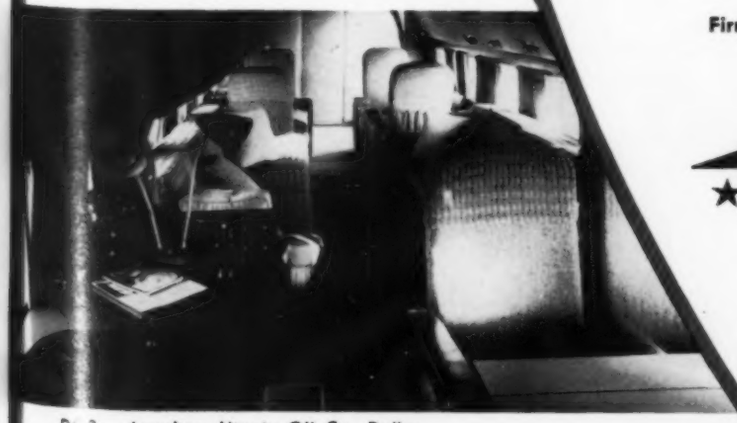

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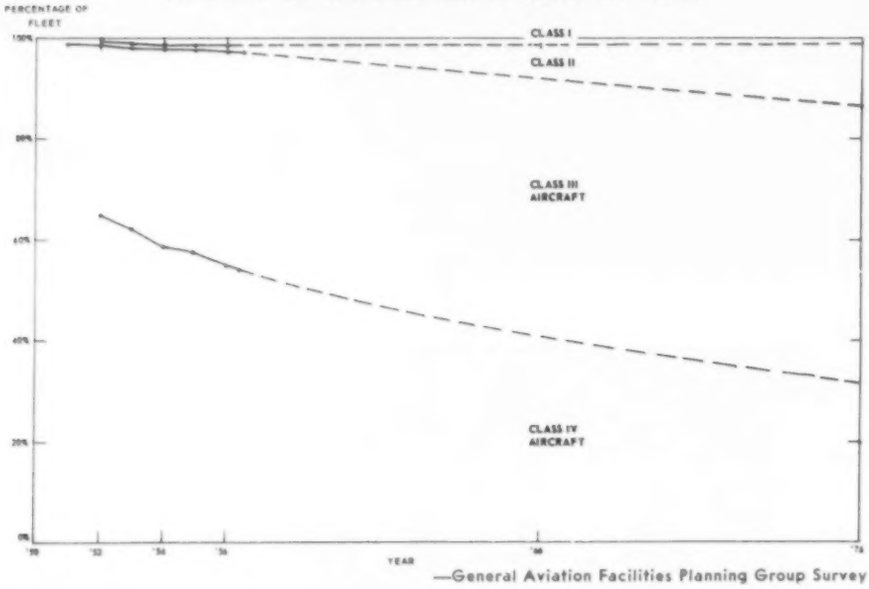
Table 64
FORECAST OF THE FLEET MIX BY AIRCRAFT CLASS



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general aviation aircraft cannot be or are not flown much more than this. It does, however, accept the fact that to a great degree the general aviation aircraft—particularly in the business fleet—are scheduled to the convenience and needs of the passengers rather than to generate the full operating potential of the aircraft.

In a like manner, there seems to be a tendency for utilization rates of aircraft owned or operated by individuals who have other tasks than flying to level out somewhere around 200 hours per year. This evidently accepts the fact that business flying by individual executives is only an adjunct to their regular duties—which duties occupy most of their hours—and that nonbusiness flying is mainly a week-end opportunity.

As Table 63 indicates, Class I aircraft—mainly business transportation aircraft—already have a high rate of utilization of approximately 445 hours per year. It is believed that this rate should increase to an average approaching the 500-hour ceiling by 1976. In many instances it is certain that these aircraft will be flown considerably more than this, but the over-all average utilization will continue to be held down by the two factors mentioned previously—usually only a single pilot is available and the planes are scheduled for passenger convenience to a great degree.

Class II aircraft compose the most rapidly growing elements in the general aviation fleet, and the recent past trends of annual usage have shown a rapid rate of increase. Generally speaking, these planes in their present and future use will be for business purposes of the same nature as Class I aircraft. For this reason, it is forecast that their annual usage rate will continue to show marked increase, moving well up toward the annual rate forecast for Class I aircraft. Again it should be remarked that many of these Class I aircraft will be flown for far more hours than the projected average. However, the factors of pilot availability and passenger convenience should weigh a bit more heavily in this class of aircraft. In addition, a modest number of Class II aircraft flown for nonbusiness purposes will tend to depress the average utilization somewhat.

Class III aircraft will show some increase in annual utilization, which increase will be provided almost entirely by the increased usage of this class of aircraft for business purposes. Use for nonbusiness flying—mainly of the week-end variety—will remain approximately the same.

Class IV aircraft are forecast for a slight increase in annual utilization, but these planes will be flown generally by the week-end flier, who simply does not seem to be able to pack many more flying hours into his year than he does at present.

The impact of the shifting usage of general aviation aircraft will show up in a substantially revised mix of the general aviation fleet by aircraft class. An increasing proportion of the fleet will be in Class I and Class II aircraft, with some increase in the proportion of Class III aircraft. The proportion of Class IV aircraft in the fleet will drop substantially in the face of the increased numbers of higher performance aircraft and the continuing shift of owners of Class IV aircraft to ownership and operation of Class III aircraft in the lower performance ranges. Table 64 shows the forecast trends in ration of fleet make-ups by class of aircraft.

90,000 Planes in 1976 Fleet

Combining the estimates of total flying hours with the estimated rates of annual utilization on an individual basis for each class of aircraft, we arrive at a summary forecast for the total general aviation fleet of between 80,000 and 100,000 planes. The estimated composition of this fleet in 1966 and in 1976 is shown in Table 65.

Table 65
ESTIMATED FLEET COMPOSITION IN 1966 AND 1976

Aircraft Class	1966 Range	1976 Range
I	2,100- 2,500	3,000- 4,000
II	4,400- 6,500	8,000- 10,000
III	35,000-40,000	45,000- 56,000
IV	28,500-31,000	24,000- 30,000
Total	70,000-80,000	80,000-100,000

—General Aviation Facilities Planning Group Survey

Table 66 shows the trends in total numbers of aircraft by class through the 20-year period. It should be noted that the forecasts as derived from flying-hour and annual utilization estimates are generally supported by the actual trends in numbers of airworthy aircraft by class through the past five years.

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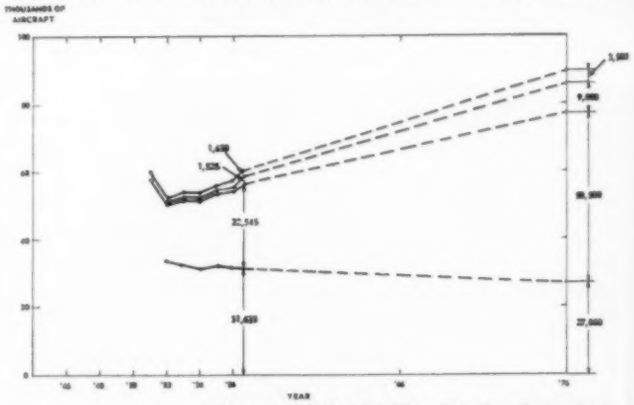
Table 66
FORECAST GROWTH OF THE AIR FLEET BY CLASS TO 1976



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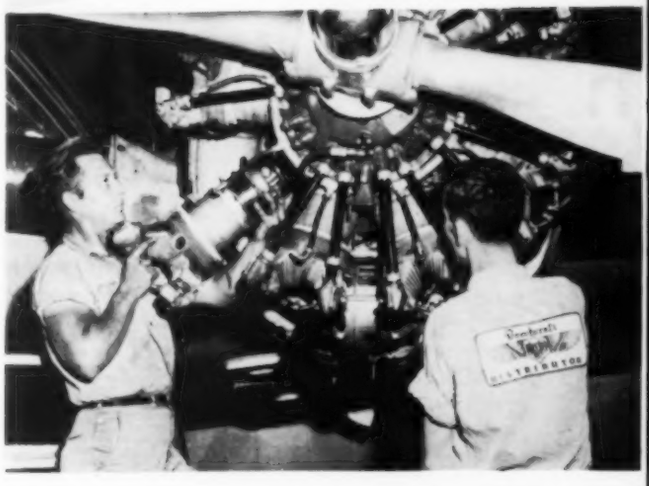

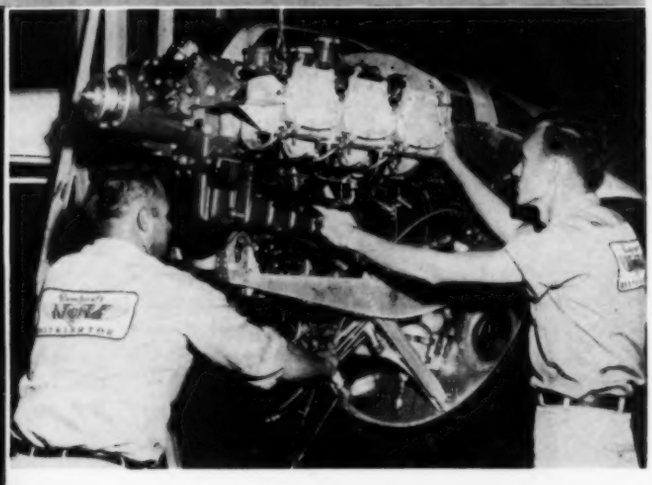

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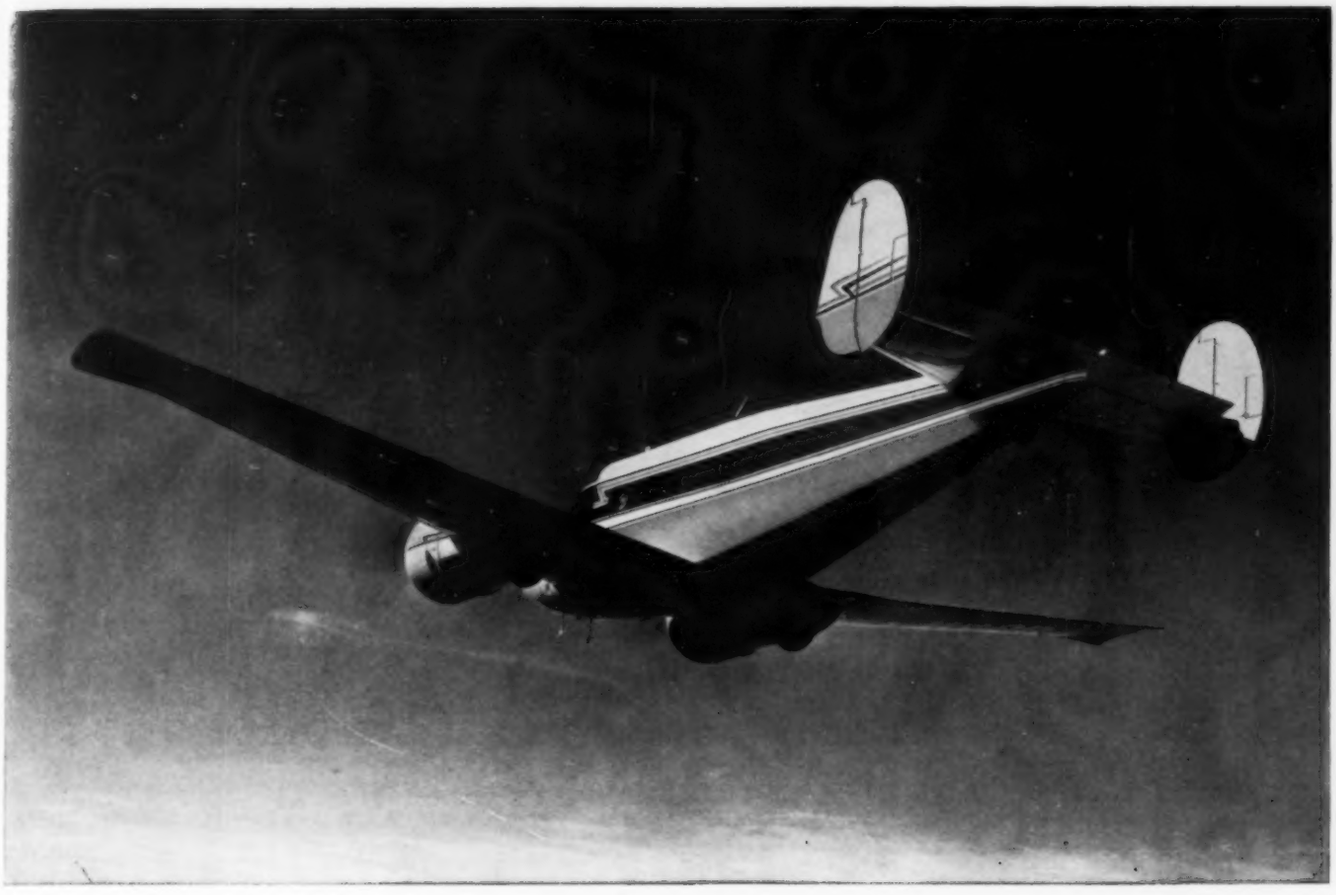

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COMMERCIAL POSSIBILITIES ARE EXPECTED FOR NORTH AMERICAN AVIATION'S NEW SABRE LINER, a 500-mph. jet utility design being built at Los Angeles in a military competition. It is powered by two General Electric J-85 jets, mounted Caravelle-fashion on the aft fuselage. In the 10-place category, it will have one-stop transcontinental range.

NATIONWIDE ROUNDUP:

New Business In the Hangar

PAN AMERICAN AIRWAYS CUSTOMER BASE at Brownsville, Texas, engaged in a wide variety of aircraft and engine overhaul work, has come up with another valuable modification for the Douglas DC-3 — squared-off wing tips. With other PAA DC-3 modifications, significant drag reduction, speed increase and improved safety are accomplished.

The La Gloria Oil and Gas DC-3, John Constantine, chief pilot, has just been completely reworked at the PAA base with modifications that really made it a modern aircraft. The 1820-G202 engines were replaced with 1820-56's, short stacks, PAA wheel doors, wing-to-fuselage fillet modification, aileron gap closure and the sharp-looking new wing tips. R. N. Hardbottle, PAA maintenance superintendent, says the direct benefits derived from the squared-off wing tips are (1) 42-in. reduction in wing span, (2) 12-lb. reduction in weight, (3) repairable tip cap and (4) no wing tip vortices. The La Gloria Oil and Gas 3 is in the "over 200" cruise class with its modifications.

Other recent PAA jobs at Brownsville included: Two Flying Tiger C-46's overhauled and spruced up for delivery to the Peruvian government; extensive overhaul and modification of a DC-4 bound for Afghanistan in the service of Ariana; a Colombian Petroleum DC-3 and a Chemical Corp. B-23. The DC-4 was purchased for Ariana as part of the technical assistant program in which Pan American is very active in several countries. The Colombian Petroleum DC-3 was the second 3 from that company in the last year — it was a major overhaul with extensive electronic modification, wheel well doors, Dash 94 engines, short stacks and a special lightweight heavy duty cargo and passenger door. High Hightower, chief pilot, and Simon Theoktisto, chief mechanic, were on hand for the job. . . . Julian O'Neal had his beautiful Kroger DC-3 in for wheel doors to go with his Miner speed cowl. . . . Food Machinery and Chemical's B-23 is in for major overhaul, new cabin interior, short stacks, weight reduction program and other modifications.

NEW SQUARED-OFF WING TIP FOR DOUGLAS DC-3 is shown at left and on DC-3 in flight below. Pan American Airways says it eliminates tip vortices, cuts weight 12 lbs. and reduces span 42 ins.

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with Dick Mahoney, chief pilot, and George Johnson bringing it in. George is staying with the project and his family is vacationing with him.

We had an hour's visit at the GARRETT CORPORATION'S AIRESEARCH AVIATION SERVICE DIVISION on Los Angeles International Airport last month and the ramp was full of Convairs. Extensive work is being done on Union Carbide and Carbon's Convair 340 of New York, brought in by Capt. C. W. Maynard and Joe Pillar. It is receiving exterior stripping and repaint, installation of two Collins 17L6 transmitters, Collins 51R and 51X receivers, AM-FM tuner for the cabin radio, Bendix C-band radar, compliance with latest Convair bulletins and interior modification work. . . . Swiflite Aircraft's Convair 440 has returned to AiResearch to undergo a 500-hr. inspection and completion of latest bulletins. Capt. M. C. Barrett and George Pennington made the trip. . . . Ford Motor's Convair 240, with B. J. Bergesen, manager of transportation, is in for exterior stripping and repainting. . . . An Italian Air Force Convair 440 is getting a complete custom interior and an auxiliary power unit. . . . The American Can DC-3, flown in by Chief Pilot Jim Hopkins and Earl Dahl, will get the Maximizer kit, AiResearch lightweight aluminum oil coolers and Bendix X-band radar. . . . New 1830-94 engines are being installed on Pittsburgh Plate Glass's DC-3, along with the complete AiResearch Maximizer kit, geared aileron boost tab, Sperry D2 engine analyzer, Bendix C-band radar and two ARC 21 ADF's. Chief pilot is Buck Newton, accompanied by Bob Middlebee.

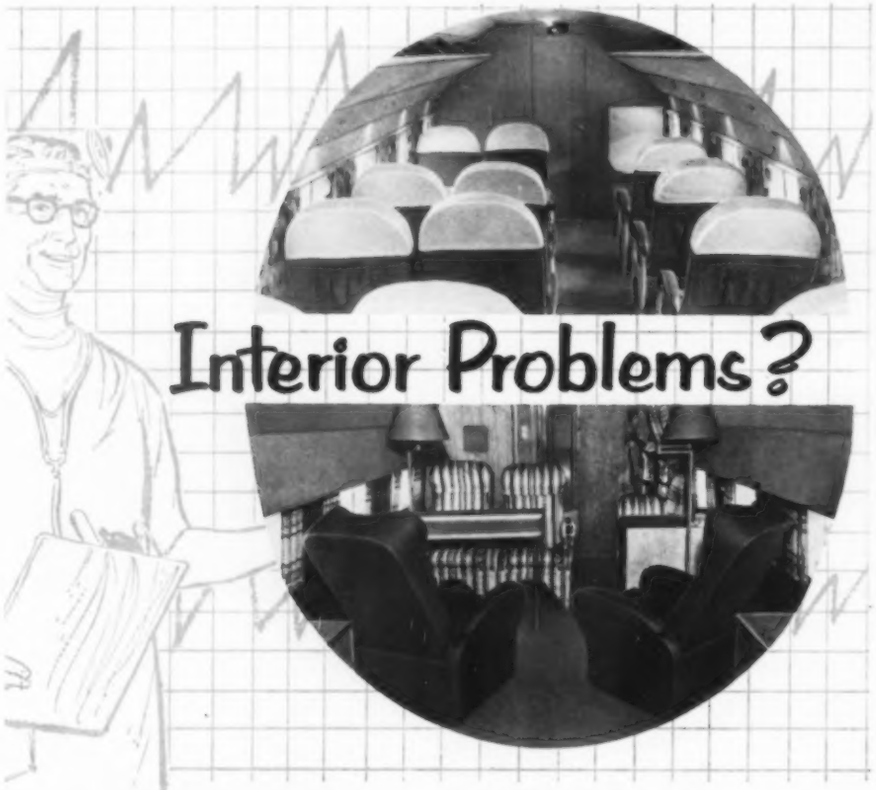
Another war surplus airplane which decorated roadside eating joints will fly again — this one is a C-47 shipped from Johannesburg, South Africa, to Torrance, California, where Roger Keeney's Acme Aircraft is restoring it as a DC-3. The South African roadhouse operator bought the C-47 for about $350, hoisted it atop his place as a roof. An American in Africa recently bought it, shipped it to Wayne Shelley, formerly with Douglas Aircraft, who is now acquiring C-47's from all over the world for his firm, Cal-Air International of Santa Monica, which sells and leases airplanes.

AMERICAN AIRLINES WILL OFFER 10 CONVAIR 240 AIRLINERS on the market this fall. Red Mosier, senior vice president, says American is converting six DC-6 aircoaches to standard-fare transports and will use them on some routes now operated with Convairs, releasing the 40-passenger 240's for sale. He has 73 Convairs. The Convairs are priced at $375,000 each.

Lodestar as well as Ventura work is performed by HOWARD AERO SERVICE at San Antonio International Airport. It has installed a new interior in Elton Rust's Negley Bag and Paper Lodestar. . . . National Steel of Pittsburgh, Bob Hamilton, chief pilot, has had both of his Lodestars in for standardization of cockpits to conform to the cockpit in the company's Howard Super Ventura. . . . Texas Gulf Sulphur's Lodestar, Fred Ayers, chief pilot, has had a double engine change, 100-hr. inspection and installation of a Narco 1016. . . . The Frank Waters Lodestar, Bob Donnell, chief pilot, has had a tank reseal, wing overhaul, paint job and double engine change. . . . Howard Aero is installing R-2800-CB16-AM5 engines in Copano Oil's Super Ventura. Hub Gayle is chief pilot.

REMMERT-WERNER at St. Louis has installed R-W lightweight landing gear doors on Nationwide Insurance's DC-3, which also got a new paint job. . . . Max Jobst brought in the Indiana Gear Works DC-3 for an engine change. . . . Chemstrand Corporation's Lodestar, Bob Hinds, chief pilot, was in for a 1,000-hr. inspection and paint job, and the Schenley Industries DC-3 received a 1,000-hr. inspection. . . . Remmert-Werner at Toledo performed engine changes for Mike Nicholsen's Mine Safety Appliances DC-3, Bill Lomasney's Bower Roller Bearing Mallard and Fred Hotson's Ontario Paper Super DC-3.

Just about everything was a matter of repeat business for HORTON & HORTON CUSTOM WORKS at Ft.



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CUSTOM EYEBROW RADIO PANEL FOR AERO COMMANDER, installed for Johnson Air Interests of Racine, Wisconsin, by Associated Radio, Dallas, has (from left to right) speaker audio selector, pilot's audio selector switches, range filter, ARC T-20 transmitter, mike selector, Dare VHF transmitter-receiver with volume control at center, No. 1 ARC 15D omni, ARC 21 ADF, No. 2 ARC 15D omni, range receiver, mike selector, glidepath selector, range filter and co-pilot's audio selectors.

—(Associated Radio Photo.)

Worth last month. For their third Douglas A-26 interior, Pan American Petroleum (formerly Stanolind), Ferrell Roberts, Tulsa, aviation head chose cleanable white vinyl "damask" headlining and beige "bark" vinyl sidewalls. . . . An H & H Gold Crest interior, using white nylon, red leather and gold-swirl vinyl sidewalls, was installed in another Aero Commander 520 for Bill McDavid of Houston. . . Joel Harper, Dallas securities dealer, chose turquoise for his world's most beautiful Howard, his second — he sports red and black tweed in his Swift and will get an H & H custom interior in his Douglas A-26 next month. . . . Joe Hamlin, pilot for Marshall Young, brought in his third Beech 18, this time for sea-foam green and beige interior colors. . . . Johnnie Hamp of Houston brought in J. W. Allison's Grumman Goose for complete Horton treatment prior to an Alaskan flight. . . . Sam Jennings of Western Cotton Oil returned for carpet protector, monogrammed napkins, cards and matches for his new Super 18, and Don McDonald brought his Burroughs Dove from Detroit for grills on the door, monogrammed towels and napkins. . . . Interior shampoo treatments renewed H & H interiors in Luke Allen's Neuhaus D-18 and John Loflin's Western Company Dove.

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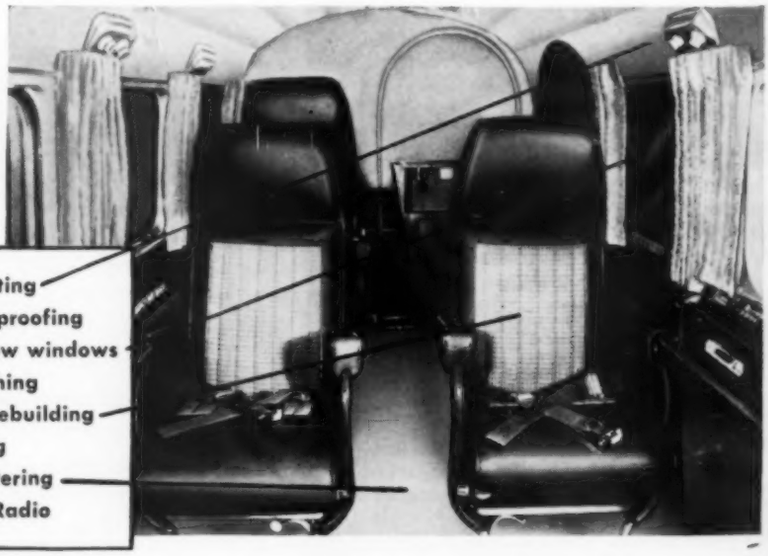

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BEST INTERIOR AWARD IN DC-3 CLASS AT READING AVIATION JUDGING went to this Remmert-Werner interior of the Huessler Aviation DC-3 from Buffalo, N. Y., Jack Prior, captain. Curtain divides cabin. Photo at left is looking forward, one at right looks aft. Fourteen-place cabin has two 3-place divans up front. At center of cabin are four swivel chairs, with four chairs aft grouped at table. Cabin has four large picture windows and electric stair door.

—(Luedeke Photos.)

AERO CORP. OF ATLANTA is starting work on a new contract to overhaul over 100 Cessna L-19 Bird Dogs for the Army and has begun operations of its newly-installed modern engine overhaul shop, the first production batch being 277 Franklin Aircooled engines for helicopters. . . . The CAA Douglas DC-3 is in for periodic inspection and a CAA Beech 18 is having its landing gear worked over. . . . Odd jobs in the hangar this month include installation of an aerial camera in the floor of a new Aero Commander for Associated Aerial Survey of Washington, D. C.

EXECUTIVE AIRCRAFT SERVICE, Garland Airport, Dallas, had four DC-3's in for various work last month. Hank Steinhauser, chief of maintenance, was in with the Creole Petroleum DC-3 from Caracas, Venezuela, for overhaul, new headlining, 1,000-hr., engine change and RCA radar installation. . . . Another Dow Chemical DC-3 from Midland, Michigan, came in for oil tank modification and engine change. . . . Ed Armstrong's Sid Richardson DC-3 from Ft. Worth got a 100-hr., miscellaneous work and landing gear overhaul, and Herb Hansen's Atlantic Refining DC-3 was in for a periodic inspection.

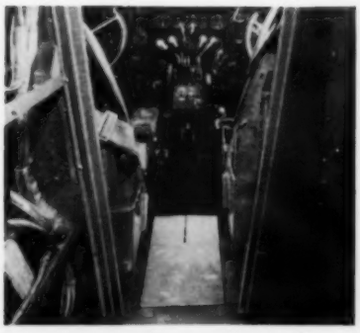
FLIGHT ENTERPRISES, Bradley Field, Hartford, Conn., has received Air Force contracts for $17,000,000 worth of overhaul work which will involve subsidiary divisions at

TUCK-AWAY Bendix RADAR FOR LODESTAR

engineered and installed by Executive Aircraft Electronics, Inc.

This unique installation of a Bendix X-Band Weather Radar System for a Lockheed Lodestar was designed, engineered and installed by the technicians of Executive Aircraft Electronics for a satisfied customer. It folds away into the floor when not in use, permitting complete freedom for the pilots and easy entrance and exit from the cockpit. The installation represents an unusual and very satisfactory solution to a problem for all owners of Lodestars — the problem of proper use of space available.

The Bendix X-Band Weather Radar System was chosen because the Bendix name stands for top quality equipment and top performance in all communications, weather radar and navigation systems. Whatever your needs are in the field of electronics, call on the craftsmen of Executive Aircraft. We take pride in saying that satisfied customers are our best recommendation. Why not find out for yourself?



View of Lodestar cockpit with Bendix X-Band Weather Radar up and in position for use and folded away in floor well of cockpit between the two pilot seats. Note also the Bendix radio equipment and the treatment accorded the overhead radio and electrical control panel.

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TWIN-TURBINE PERFORMANCE ADVANTAGES FOR HELICOPTERS are being established by this Navy HSS, modified by Sikorsky Aircraft with two General Electric T-58 turbines, each rated in excess of 1,000 horsepower, replacing its single piston engine. The experiment is proving turbine power's noise and vibration reduction, greater payload and distance capabilities and less component wear. —(Sikorsky Photo.)

GRUMMAN MODEL 159 is a pressurized twin propjet business plane designed for Grumman Aircraft's re-entry into the commercial market with 370-mph. cruising speed at 25,000 ft. The 12-passenger Grumman, with two Rolls-Royce Darts, will gross 31,000 lbs., has a 78-ft. span, 64-ft. length and 2,200-mi. range. For May, 1958, delivery, it is in $950,000 Convair price class and three distributors will handle its sales but have not been announced. Photo shows a model.

Charleston, S. C., and at McGuire Air Force Base, Trenton, N. J.

L. B. SMITH AIRCRAFT is moving into its new million-dollar base on 36th Street at Miami International Airport, just west of Pan American Airways' overhaul area. . . . LBS recently completed and delivered U. S. Steel's second executive Viscount propjet and Union Carbide's 440 Convair executive transport. . . . Under supervision of Engineering Director Ed Brush, LBS is flight testing the new Smith Super 46 transport category version, which is the result of a recent agreement between Aircraft Engineering Foundation and L. B. Smith Aircraft. . . . The third CW20T ordered by Transair has been delivered to Stockholm, Sweden.

DALLAS AERO SERVICE, Love Field, Dallas, has reworked the hydraulic system and landing gear on Ray Hodges' Odessa Natural Gas Lodestar from Midland, Texas. . . . The Rish Equipment Dove from Blue Point, West Virginia, S. J. Hyams, pilot, was in for general inspection and repairs. . . . Weatherford Tool's Twin-Bonanza from Houston had a double engine change, conversion to 3-blade props, and installation of the DAS unfeathering system. . . . The D. H. Byrd Twin-Bonanza is getting 3-blade propellers, unfeathering system, new interior, radio and paint job. . . . Jim Wells' Aero Commander of Olin Mills is in for landing gear modification and governor overhaul. . . . The Harry Hood Bassett Dove from Miami, Bob Mulligan, pilot, was in for double engine change, annual inspection and pneumatic system overhaul. . . . Inspection jobs were performed for the LeCuno Lodestar, Longview, Texas, Gene Marshek, pilot; Union Chemical DC-3 and Delhi-Taylor Lodestar, for which the pilots are Don Beeler, Charles Bolton and Dick Dewey; Slick Slaughter's R. H. Fulton Beech E-18 from Lubbock, Texas; Al Scarlatta's Tidewater Oil Lodestar from Tulsa; Bob Dodson's British American Oil Lodestar and Slade Oil's Aero Commander from Monroe, flown by Marion Cole. . . . Special modifications were performed on a University of Illinois Aero Commander, flown in from Tucson by Capt. Dyer, and used in radar experiments.

SOUTHWEST AIRMOTIVE Rocky Mountain division at Denver has been named distributor for Bendix Aviation's Red Bank division.

REMMERT-WERNER, St. Louis, has delivered a second DC-3 to General Mills, Minneapolis, and its 14-place cabin has work tables, adjustable desks, electrical outlets for calculating, office and dictating machines. It has Sperry A-12 autopilot, Sperry H-5 electric gyro horizon, dual Collins 51R-3 omni receivers with RMI radio magnetic indicators, 560-channel communications receiver, Collins 17L-3 transmitter, Collins 51V glideslope, Edison fire detectors and custom radio and dual instrument panels.

The Good Old Days

EDDIE Bellande, one-time notable figure in flight testing, tells a tale that would outdo the most imaginative movie script writer. Eddie is now a vice president of the Garrett Corporation, Los Angeles, a major manufacturer of aircraft pressurization and air-conditioning systems, components and accessories. Bellande's anecdote developed from flight testing of the first Lockheed Vega, forerunner of a historic aircraft series.

"As part of the test," he relates, "I made a fast pass at the airport. Then I pulled the airplane into a steep climb, practically hanging it on its prop. With the force of gravity suddenly pulling hard on my seat in the cockpit, my chair broke loose. Just like a movie comedy, I immediately toppled over backward out of the pilot's seat, through the compartment door and into the cabin which was filled with sandbags for ballast. Then the door slammed shut in my face and there I was alone in the cabin with the plane still climbing.

"Finally I got the door open, but the broken seat was blocking the aisle and I couldn't get through to the controls. All I could do was throw myself in a prone position across the tilted chair where I could barely reach the stick just as it was ready to stall. In that prone position, unable to see where I was flying, I managed to level off and keep the plane in flight. It took me fifteen minutes before I was able to get up enough courage to let go of the stick, scramble over the wrecked chair, and get myself in some sort of a sitting position where I could again fly the plane properly and bring it in for a landing. It's fun to tell it, but it was nothing to laugh at then."

MIDWAY TOWER

(Continued from page 38)

ture times during IFR conditions. The ground controller handles all ground traffic when planes are clear of the active runways and handles IFR departure clearances to aircraft. The departure controller handles IFR departure clearance after take-off with the aid of air surveillance radar, maintains contact with departing aircraft, making sure that planes keep a three-mile separation in bad weather. There is sort of an imaginary "fence" around Midway, the boundaries of which vary from eight to 15 miles from the airport itself. Inside this "fence," aircraft are under the control of the tower and outside the "fence," aircraft communicate with the center.

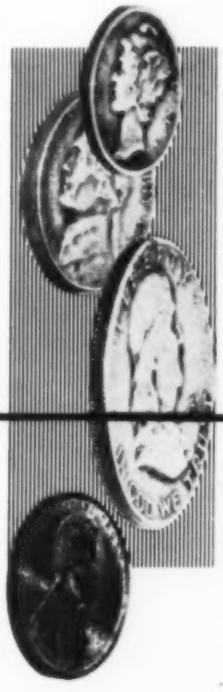
It is interesting to note tower procedure in handling helicopter traffic. Chicago Helicopter Airways maintains scheduled flights between Midway, O'Hare Field and the Chicago Loop. Inbound flights contact the tower about three miles out. When the helicopter pilot arrives over the airport, he is instructed to change to ground control (121.7 mc). Final landing clearances and taxiing instructions are given on this frequency.

By far the busiest man in IFR weather is the ground controller, for not only does he have supervision where planes are taxiing all over the field, some of which he can't see when the visibility is restricted, but he must handle and receive confirmation back on all IFR departure clearances from departing pilots. Normally, controllers are rotated among the positions each hour. However, due to the shortage of trained personnel, this must sometimes be extended to as much as four hours.

All radio transmissions, both by the pilot and the tower, are recorded on magnetic tape. Three recorders run continuously and there are four frequencies being recorded simultaneously on each tape. The tape is stored for thirty days and unless a traffic incident is involved requiring a replaying of the tape, it is then de-magnetized and used again.

Radar seems to be the bright star in solving air traffic jams and in reducing the time that an aircraft must hold at an intersection until it is cleared to make an approach to the airport. Even with radar in Chicago, the center has advised pilots that traffic delays might reach two hours. Midway Tower is fully equipped with precision approach radar (PAR) and both inbound and departure airport surveillance radar (ASR). Both of these operations are monitored in the lower level of the tower and a second ASR unit is in the upper level for the sole use of the departure controller. The scale of the field of vision may be changed instantly on either of these units. The scope for ASR may be adjusted for a 30-mile, 20-mile, 10-mile or 6-mile radius. This unit shows a plane as a "target" and the direction and distance of the plane from the airport is instantly determined, but the plane's altitude cannot be shown. PAR equipment can be set for a radius of ten miles or down to two and one-half miles. On two scopes the controller can monitor planes, determine the azimuth, distance from the field and altitude. This enables him to see instantly whether the aircraft is above, below, or on the glide path and localizer on final approach. With radar the tower can confirm or help establish a pilot's position. ASR requires three men in bad weather. PAR requires one controller.

There is one instrument landing system (ILS) at Chicago, even though the airport has dual runways in each major direction. There is a compass locator on the ILS back course for ADF approaches. Dual ILS would give the airport a higher acceptance rating simply because most departing aircraft, usually at full gross weight, are confined to take-off on the long ILS run-



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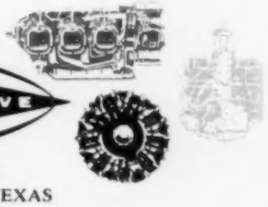

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way. This restricts both landings and take-offs to a single-runway operation.

Published minimums at Midway are 1,000-ft. ceiling and 3-mile visibility; however, with radar, both the airport and the pilots operate under the look-see policy. On an ILS approach under this arrangement, the pilot may go as far as he likes down the glide path even though he can't see the ground. The tower will observe his aircraft on radar and will tell him where he is at all times. It is entirely up to the pilot's judgment as to whether he continues his approach and lands or calls out "missed approach" and goes back up into the "stack." Under this look-see policy, airliners have landed with the weather at 100-feet and one-fourth mile and some private planes have landed when conditions are zero-zero.

In IFR weather, Midway has handled as high as 240 departures and 221 arrivals in one eight-hour period. Frequently, the controllers will take ten to 12 planes out of the "stack" at one time and clear them inbound for an ILS approach.

Inbound and outbound altitude and horizontal aircraft separation seems to work without a hitch. Departing aircraft may be cleared to maintain 2,500-feet, 3,500-feet or a maximum 4,500-feet. Inbound aircraft are never cleared below 5,500-feet unle the approach lane is clear. They ar then cleared to 2,300-feet over th outer marker. Victor 6 and Victor 6 airways are restricted for outboun use only. Victor 97 and certain othe airways southwest of the field are use only for inbound aircraft.

All of these electronic aids at th tower and at the center require con stant maintenance. Radar alone re quires a staff of ten men for adjust ing and repairing the equipment. All other transmitters and receivers are maintained by 15 radio repairmen.

Controllers also have their prob lems. In fact, the other day with the visibility less than two miles, a plane was cleared to make a straight-in approach and land on runway 13. The pilot confused this instruction by some 180-degrees and the next thing the tower saw was this plane landing on Runway 31. This required some fast communication with other aircraft departing and landing on 13. In a tower as busy as at Midway, they are prepared for practically anything.

The controllers at Midway foresee no difficulty handling the jet airliners of the future. It will be the problems of the airlines themselves to manage their fuel in order that they can hold or proceed to an alternate.

outperform them all with a
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Met-L-Matic is shown on Cessna 182.

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"World's largest manufacturer of metal propellers for personal and business aircraft."

LAKE TAHOE'S GULLS

(Continued from page 28)

Gull pilots. On our take-off, with little or no wind, it took about 58 seconds — right at one minute — for us to accelerate to take-off speed. Bob Hanley, our pilot, held it on while detailing the technique. "You get to where you anticipate when it is going to be ready to lift off," Bob said. At 70 we thought it was, but he continued to hold the nose down as we skimmed lightly across the surface. In no time at all, though, he had it up to 80 and flying out of the spray. Even then, however, he held the nose down for quite a distance before there was speed for the turn and climb out.

Normally, a wide turn is sufficient to reach 8,500 ft. while still over the lake before leaving through the pass. But this time we had a little upslope breeze to soar on without the wide climbing turn, and Hanley headed for the trees with the air currents riding us up and over the ridges like a sailplane.

The Gull has a single-engine service ceiling of 4,100 ft. at gross weight and with a slight reserve in climb speed, but on the slopes down from Tahoe are several small lakes at various altitudes and the Gull could make several of them if an engine quit at 8,500 ft. over 7,000-ft. terrain. A demonstration showed that it handled well with an engine idling, this giving more drag than a feathered engine, and with both engines idling it had sufficient glide for us to make a lake 6 or 8 miles away. Engine-out safety is the Gull's biggest factor in the Bay-Tahoe operation.

Law and Hanley, both top boat pilots, praise the Gull as one of the most modern aircraft designs available anywhere — both as a landplane and as a boat. Its pusher engines, for example, have perfect cooling without fans or gadgetry. They were approaching the 1,000-hr. mark without overhaul in the Gull we used for the Tahoe trip. It was a revelation to ride through their demonstrations of difficult water maneuvers back in San Francisco Bay — cross-wind and turning take-offs, fast downwind taxiing, high-speed running with a float intentionally submerged for its hydrofoil lift effect and the full gamut of water flying techniques. The windshield was dry throughout it all. There was never any tendency to porpoise, even when deliberately tried. Water landings are flown on for smoothness ,stalled landings being avoided because they result in a bounce every time. With excellent

Seaplane Saves Man Hours, Cuts "Down" Time for Ashy

A Cessna 180 on Edo Amphibious Floats is proving invaluable to the Ashy Construction Co. of Eunice, La.

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side-slipping, even the smallest lakes are open to the Gull. It will climb out at 1,000 fpm. at sea level.

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Airport Motels to Appreciate

Except for two resorts — the Cal-Neva Lodge on Lake Tahoe and the recently-opened $16,000,000 Tropicana in Las Vegas, we used new motels exclusively on this trip and can recommend each of them — the Flamingo near El Paso Airport; Hyatt House near Los Angeles International Airport; International Inn close by San Francisco International Airport; Holiday Inn on Highway 101 near the seaplane base at Sausalito, California, and Louis Chanin's recently-expanded million-dollar Sky Riders Hotel right in the middle of Sky Harbor in Phoenix. All of these fine motels are resort-type and Chanin's beautiful Sky Riders at Phoenix is without question the world's finest example of deluxe treatment for air travelers, with swimming pool, Sky Chef restaurant, cocktail lounge and bar, beautiful rooms, and perfected soundproofing (we didn't hear an airplane all night, even though it is in the center of the airport). Just a few steps from the private plane terminal, Chanin's inn has electric buggies with fringe on top to transport guests and their baggage from terminal to lobby. He's the happiest and proudest hotel man in the country — business was never better.

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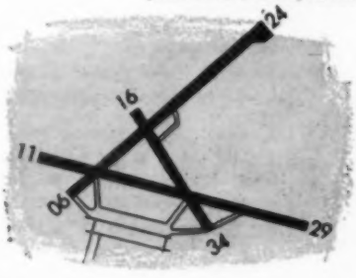

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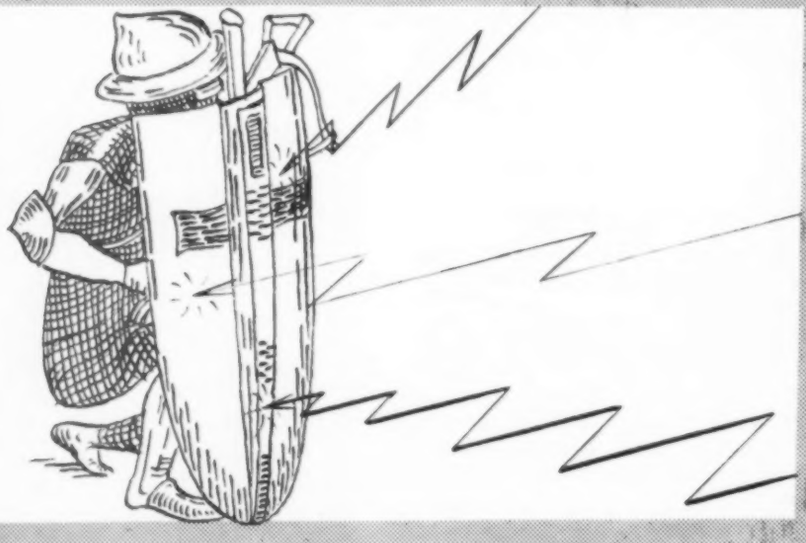

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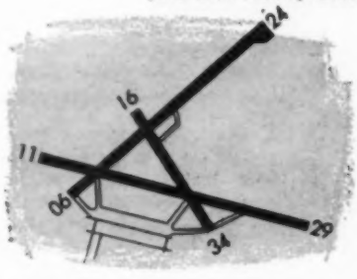

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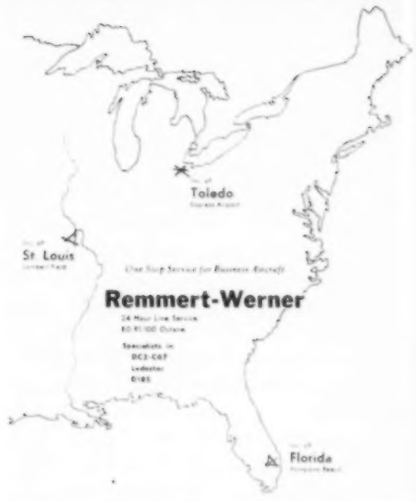

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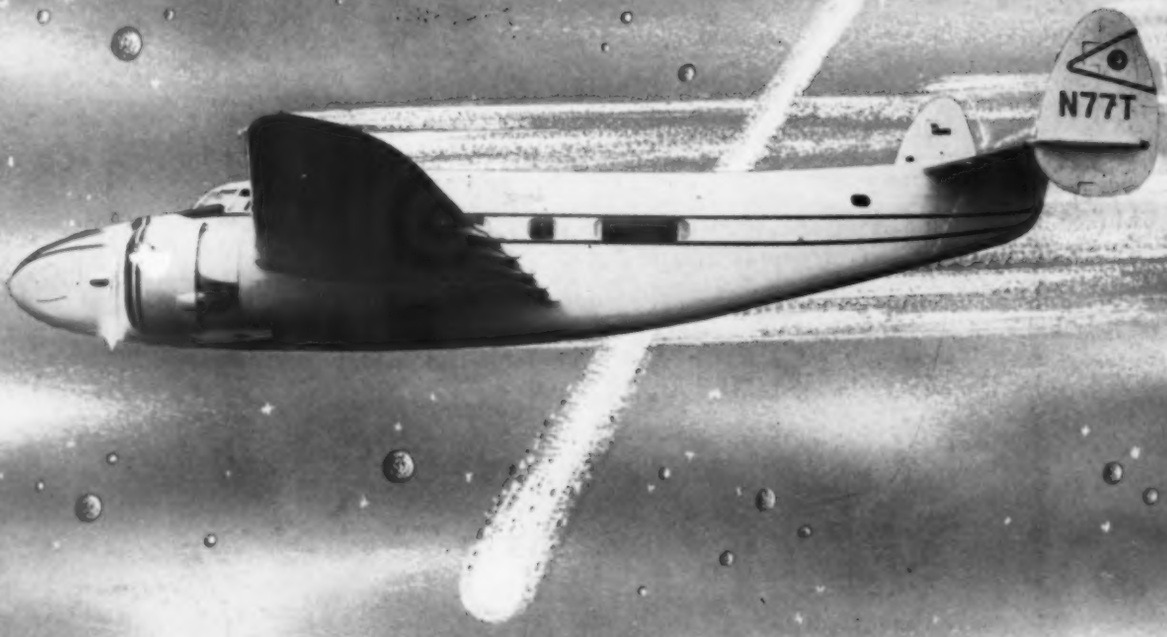

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